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The Iron and Steel foundries Regulations 1953

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PRINCIPAL CONTENTS

Technical: PAGE

The Foundry Industry in Australia, by A. W. Silvester: The Paper is a description of the post-war foundry industry and as a necessary background, the Author gives in the first section, printed this week, an overall picture of the Australian scene, dealing with such matters as the basic structure and economy of the country and material, power and fuel resources 167

Metal Melting Furnaces; by F. C. Evans, F.I.M. Survey of equipment available based on fuel characteristics, followed by a report of discussion 177

Chill Testing, by A. P. Alexander: Short Paper presented to the South African branch of the Institute of British Foundrymen 181

Features:

Leader: Depreciation 165
Congress Paper Author 166
Correspondence 166
Forty Years Ago 166
Notes from the Branches 182

Commercial:

American Iron and Steel Statistics . . 180
German Pig-iron and Steel Output . . 182
Company News and Increases in Capital 184
Raw Material Markets 190
Current Prices of Iron, Steel and Non-ferrous Metals (Advert section) . . 32

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Depreciation

Every time there is an increase in coal prices, attention is focused on selling prices, but some quite serious implications are liable to be overlooked. For instance, it is obvious that purchases of machinery will soon cost more, and the gap widened between the price of existing installations and the plant destined to replace them. There is no longer any contentment in the fact that a machine is worth nothing on the books and that there is a fund available, based on the cost price of that machine, for a replacement value established, say, 20 years ago. Such a reserve would scarcely go half way to meeting to-day's cost of replacement. A good deal of the misconception as to the implications of depreciation is due to the statutory percentages allowed by the Income Tax authorities, who presumably have failed to realize the profound effect of inflation on the price of new plant.

Some good advice on this subject has been given by Mr. John L. Carter to readers of *Gray Iron News* the house organ of the (American) Gray Iron Founders' Society. Rightly, he insists that the cost of proper—not the Income Tax figure—depreciation should be included in the selling price of castings. He also advocates the obtaining of a report covering the last five or ten years of (*a*) the total amount charged to depreciation reserve, and (*b*) the total amount spent on replacements or new equipment, and insists that if (*b*) does not exceed (*a*) by a substantial amount the firm has not been keeping its equipment up to its past level of efficiency. As a last piece of advice, he counsels that a definite modernization programme should be planned. This will obviously involve new equipment, improved layout and so forth. Each item should be given a certain priority and a date upon which it is to be bought. Then comes the reminder " If you haven't got the money to put through this programme fast enough, it proves that you have not been following a sound policy in regard to depreciation and replacement of old or obsolete equipment."

Perhaps this last statement is a slight exaggeration, as there are many factors other than depreciation which enter into the subject—devaluation being one of the more important, yet his dictum deserves respect, because depreciation is a serious item of cost liable to be undervalued or even forgotten when estimating the cost of castings. There is of course the higher value of secondhand machinery, which may help. Then, in addition, most firms carry a general reserve, which may be used for modernization though it is not specially earmarked for that purpose. Yet, if we read Mr. Carter's basic advice correctly, it is that depreciation is a running charge and should be regularly included in the selling price of castings, and in this view we most emphatically concur.

German Foundrymen's Association

Annual Meeting, Dusseldorf, September 22 to 24

The 46th annual meeting of the *Verein Deutscher Giessereifachleute* (German Foundrymen's Association) will be held in Düsseldorf from Thursday to Saturday, September 22 to 24. On the opening day, there is a choice of eight works visits whilst in the evening there is a visit to the theatre. On the Friday, two simultaneous technical sessions are being held at the Robert-Schumann-Saal and the Kleiner Kongress-Saal.

Session A.

Starting at 9 a.m. the following papers will be presented:—"Induction Furnaces" by Dr. K. Brockmeier; "Chemical Reactions in the Cupola" by Prof. H. Jungbluth and Dr. K. Stockkamp; "Principles of the Cold-blast Cupola" by Dr. W. Patterson; and "Ironfoundry Melting Furnaces" by Dr. B. Marincek.

In the afternoon, starting at 2.30, there are to be papers on:—"Gas Annealing of Malleable" by Prof. K. Roesch; "Influence of Slag Composition on Nodular-graphite and Malleable Cast Irons" by Mr. H. Morrogh; "Stage of Development and the Application of Nodular-graphite Cast Iron" by Mr. K. Figge; and "Influence of Some Elements on the Nodular-graphitic Structure of Cast Irons" by Prof. A. De Sy, and Mr. J. Verelst. There is also to be a film show: "Possibilities of Rationalization in the Foundry Industry" (General Motors Corporation).

Session B.

Again starting at 9 a.m., the following is the programme:—"Viscosity of Liquid Metals and its Effect on Running Properties" by Dr. T. P. Yao; "Mechanical Testing and Technical Properties of Alloy G AlSi 6 Cu 3 (225)" by Mr. O. Asbeck; "Problems of Inoculation" by Prof. E. Scheil; and "On the Structure of Cast Iron" by Dr. A. Wittmoser, Dr. L. Hutter and Mr. H. Krall.

The afternoon begins at 2.30 p.m., with:—"Recent Information on the CO_2 Process" by Dr. W. Schumacher; "Structure of Cast Iron as revealed by Microscopic Examination of Colour" by Mr. G. Aubrion; and "Melting and Casting of Titanium" by Mr. H. W. Schleicher.

At 8 p.m. on that day there is to be a social evening at the Rheinhalle. An interesting programme has been arranged in the afternoon for the ladies. For members only, on the Saturday morning there will be the annual general meeting of the Association.

The programme of works visits includes excursions to the following foundries:—Henrichshutte (grey iron and steel); Wittman A.G. (steel and malleable); Bergische Stahlindustrie (steel); Bochumer Verein A.G. (steel); Hilden A.G. (iron); Wanheim G.m.b.H. (grey iron); Krupp (grey iron); and J. G. Schweitzke (non-ferrous).

A Reminder: Members of the Institute of British Foundrymen who wish to take part in the National Works Visits Day function in the Bristol area on Friday, October 7, are reminded that the closing date for receipt of applications is September 10. As numbers are limited for each of the five parties, it is obvious that early applicants are the most likely to be accepted for the works representing their first choice. Full particulars were printed in the JOURNAL of July 28; applications for places should be addressed to Mr. G. Lambert at the head office of the Institute in Manchester.

Congress Paper Author

Mr. A. W. Silvester, Author of the official Australian (Victoria) branch Exchange Paper—"The Foundry Industry in Australia" printed on page 167 of this issue—holds the position of materials engineer with Repco, Limited, Melbourne, and has for the past 13 years been closely associated with the manufacture of automotive parts. A member of the American Foundrymen's Society and the local Institute of Metals and the Institute of Management, Mr. Silvester joined the Council of the former Institute of Australian Foundrymen, Victoria division, in 1948. He was president from 1950 to 1952, and it was during his term of office that plans were made for the amalgamation with the Institute of British Foundrymen. Since this amalgamation, he has been appointed branch representative to the Council of the Institute. At the American Foundrymen's Convention held in St. Louis in 1949, Mr. Silvester read a Paper on "Secondary Graphitization of Cast Iron by Heat-treatment," which was then the official exchange paper from Australia.

Forty Years Ago

In the August 1915 issue of the JOURNAL, there is an interesting article on the substitution of the major part of the coke in cupola practice by liquid fuel. The process was based on a Patent granted to that well-known American metallurgist, Mr. Bradley Stoughton. The final result was given as 20,300 lb. (9 tons) of metal were melted with 2,100 lb. (18·7 cwts.) of coke and 72 American gals. (60 gals.) of oil, or 105 lb. of coke per 1,000 lb. of metal. Nothing very sensational, but related to the 245 lb. previously used it did show a 50 per cent. reduction. From another article on malleable iron annealing ovens, the following phrase is culled, "Oil-firing, however, has little interest for British makers of malleable." The death of the Manchester-born American foundry expert, Thos. D. West, is recorded.

Correspondence

SINTERED *v.* SHELL-CAST

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—In the FOUNDRY TRADE JOURNAL of July 28 there is a paper by Hiram Brown, B.S., on the "Evaluation of Casting Processes." Figs. 9 and 10 on p. 91 show "Typical shell-cast austenitic stainless-steel castings." We are wondering whether consideration has ever been given to making such castings by powder metallurgy. It would appear from the photographs that these two parts, and more particularly that illustrated in Fig. 9, might well be produced more economically, with less finishing, and at a faster rate, by powder metallurgy than by shell casting.—Yours, etc.,

for George Cohen Sinteel, Limited,
FELIX L. LEVY,
Director.

Broadway Chambers,
Hammersmith,
London, W.6.
August 9, 1955.

The Foundry Industry in Australia*

By A. W. Silvester

This Paper is a description of the post-war foundry industry in Australia. The industry of this country gained a tremendous upsurge of manufacturing technique during world war II, but it has been during the post-war period that the industry has expanded to meet the demands of the market to absorb labour, and to produce a quality casting at a competitive price. The Paper is divided broadly into four chapters—"Australia To-day"; "Basic Material and Power Resources"; "The Foundry Industry"; and "Australia To-morrow." Since the foundry industry is a section of the engineering industry, which, in turn, is a part of secondary industry, it is important to relate the foundry industry to the basic structure and economy of the country. This is the theme of the first section, which covers the subjects of population, value of production, transport, etc. In some instances, it will be shown that the basic structure of the country has directly affected the industry and its mode of operation. The title of the second section is self-explanatory. The quality and price of raw materials have an important bearing on foundry techniques and operation, and it is shown that generalizations on foundry practice are often misleading, unless all the factors of fuel, metal, sand and refractories are clearly known. The section headed "Foundry Industry" is a description of typical foundry conditions. The degree of technical supervision in the industry is still very low and urgent steps are being taken to train suitable men for this work. The jobbing moulder is dying out and is being replaced by machine moulders, which is a serious problem the industry has to face. Finally, "Australia To-morrow" is a short section outlining some of the known plans of national and private development which will directly or indirectly promote the growth of the foundry industry.

Introduction

This Paper has been written with the object of presenting a broad picture of the foundry industry in Australia. The subject matter is not technical; but it is a pictorial presentation of a few of the major facets of the industry, and is written as an introduction of founding in Australia to the reader who is unfamiliar with the practice in that country.

During 1953, a branch of the Institute of British Foundrymen was formed in Australia by the amalgamation of the Institute of Australian Foundrymen, Victorian Division, into the elder Institute. This is the first occasion on which a Paper has been submitted from the Australian branch, and it was the common desire of the Branch Council that it should be devoted to a description of the Australian scene. It is the Author's wish that the descriptions and facts presented will give the British foundrymen some idea of the scope of the industry in Australia, and perhaps answer some of the questions of the reader who is unfamiliar with this member of the British Commonwealth.

AUSTRALIA TO-DAY

Population

Australia has an area of 2,974,581 square miles and a population of 8,962,281[1] or approximately three people per square mile. However, the distribution of the population is concentrated on the coastal regions, and more particularly on the east and south east coasts. It is in these concentrated-population centres that the major secondary industries operate. Analysing the census figures[1] and consulting the map (Fig. 1), it will be seen that the State capitals, the major industrial cities and towns of a population greater than 10,000 persons account for 67 per cent. of the total population. The degree of concentration will be seen from the census figures of the capital cities shown in Table I.

TABLE I.—*Population Statistics of Australian States.*

State.	Population of State.	Capital City.	Population of Capital City.	Percentage of population.
New South Wales ..	3,482,019	Sydney ..	1,624,470	46.65
Victoria	2,430,850	Melbourne	1,426,500	58.68
Queensland	1,274,773	Brisbane ..	484,000	37.96
South Australia ..	770,926	Adelaide ..	469,000	60.80
Western Australia	637,429	Perth ..	358,000	56.16
Tasmania	317,751	Hobart ..	93,480	29.41
Australian Capital Territory	31,292	Canberra	29,230	93.41
Northern Territory	17,241	Darwin ..	8,590	49.82

Labour Distribution

To cater for the needs of the population, the working force of the country can be approximately split into two major groups—secondary-industry manpower and primary-industry manpower. An analysis of the Australian scene, taken from the census of 1947,[2] shows that of the population, 37.1 per cent. of the total were engaged in secondary industries and 17.6 per cent. were engaged in

* Official Exchange Paper from the Australian (Victoria) branch to the fifty-second annual meeting of the Institute of British Foundrymen last June. The Author is materials engineer with Repco, Limited, Melbourne.

primary industry. The percentage of labour force engaged in secondary industry will now be higher, since the secondary industries of Australia are rapidly expanding, and the ratio of primary to secondary activities is becoming nearer to the level obtained by the other nations of high living standards.

A dissection of the 1947 census figures,[2] covering the engineering and metal-working occupations, gives the following picture of labour distribution, and further illustrates the remarkable degree of labour concentration into the major States (see Table II). This has both beneficial and adverse effects on the economy of the Country as will be shown later.

Expressing the manpower engaged in the various sub-groups in percentages of the total population of 1947 census, it is found that 2.8 per cent. are in the engineering and metal trades, 0.6 per cent. are in the extracting, refining and founding of metals, and 0.9 per cent. are engaged in the vehicle manufacturing and repair industry.

A later survey of labour employed in the ferrous foundry industry was made in May, 1952, and is shown in Table III.[3]

The proportion of labour engaged in foundry occupations in Australia is relatively small, but the expected percentage - increase over the next few years will be large if the trend of industrial expansion continues at its present rate. For example, in the ferrous foundry industry, there was an increase of 6 per cent. between the middle of 1950 and May, 1952,[3] and such an increase can be considered large, despite certain financial restrictions operating over that period.

Labour Organization

The organization of labour throughout Australia has been developed to a high degree. The trade union movement has a national rather than a parochial outlook and has become closely associated with the Labour Party. Private treaty between a trade union and a company is common, but conditions of work, disputes, etc., usually involve whole sections of industry. The unions were affiliated in 1927 under the Australian Council of Trade Unions. The objective of the Council is the socialization of industry, *i.e.*, production, distribution and exchange.

The membership of the 360 trade unions in Australia, at the end of 1952, was 1,637,542. The industrial sub-group, covering engineering, in which the foundry industry is included, consisted of fifteen unions with a membership of 245,831.[4] The foundry-industry unions are the Moulders Union,

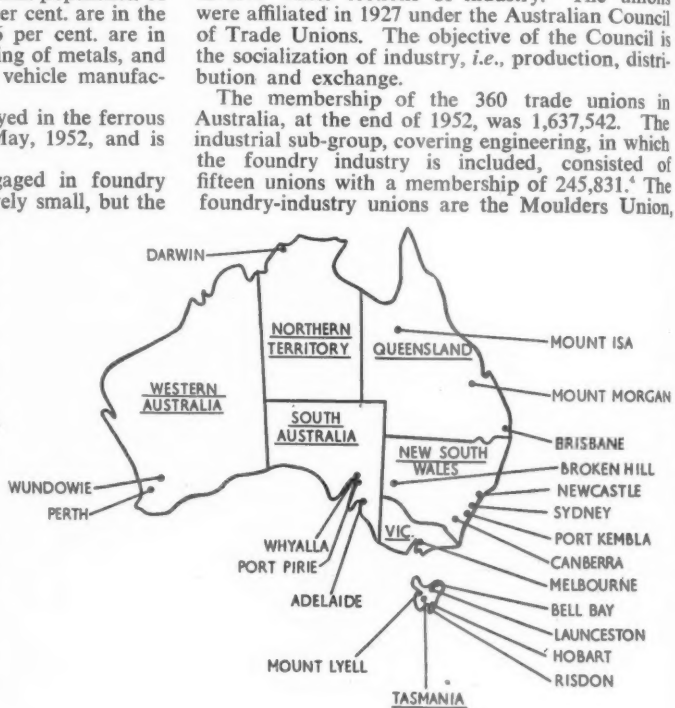


FIG. 1.—*Map of Australia, showing capital cities and important metallurgical centres.*

TABLE III.—*Foundry Labour Distribution.*

State.	Firms.	Approximate Number of Employees.
New South Wales	144	6,530
Victoria	140	4,310
Queensland	54	1,470
South Australia	56	1,700
Western Australia	39	1,020
Tasmania	13	190
TOTAL	446	15,220

* Values throughout the Paper are given in Australian currency—one Australian pound equals 16s. sterling.—Editor.

TABLE II.—*Distribution of Labour in Engineering and Metal-working Occupations*, 1947.

Group.	State.							
	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Capital Territory.
Founding engineering metal working (including ship building)	107,501	57,147	13,660	20,281	6,473	3,447	63	33
Extracting, refining and founding of metals	26,210	7,655	2,278	4,663	1,220	1,999	21	3
Manufacture, assembly and repair of vehicles, parts and accessories	23,716	20,601	7,914	11,018	4,002	1,158	44	9

the Federated Iron Workers Union, and to a lesser extent, the Amalgamated Engineering Union.

Industrial Disputes

Australia has been criticized in the past, by other industrial nations, for the spate of industrial disputes which, at the time, appear to upset the national economy. This criticism is based upon unfair comparisons, and totally disregards the fact that Australia has led the world in industrial legislature and arbitration. It is a worthwhile thought that industry has had to cope with, and has successfully overcome, industrial troubles while still in its infancy.

During the past two years, there has been a marked decrease in hours lost due to industrial disputes, and working conditions are far more stable. The causes for this are not within the scope of this Paper, but to give the reader some factual idea of this facet of industrial life, the graph shown in Fig. 2 has been included. It shows that industrial trouble fluctuates between mining, engineering and transport. The high losses recorded for engineering from 1945 to 1947 include a general engineering strike for the forty-hour week.

The causes of industrial disputes are officially classified as follows:—(*a*) wages, hours and leave; (*b*) physical working conditions and managerial policy; (*c*) trade unionism, and (*d*) undefined. Group (*b*) disputes constitute more than 50 per cent. in all industries, but in the mining and stevedoring industries, it is nearly 70 per cent. Groups (*a*) and (*c*) constitute approximately 10 per cent. each of all disputes.

Value of Production

A value must be set on national effort, and for this purpose, the Conference of Statisticians, held at Sydney in 1925, defined the value of production "as the value of consumable commodities produced during the year, deducting so far as possible the value of goods consumed in the process of production."[4] On this basis, the value of factory production in Australia, for the year of 1950-51, was £843,605,000.*

It is difficult to relate accurately one small section of industry to the national effort as a whole, but the foundry industry may be considered as part of the group of industrial metals, machines and conveyances. The value of production for this group in the same year is £326,993,000, or approximately 40 per cent. of the total production value. This is important, since it compares the engineering industry with all other industries, the highest of which is the food production, valued at £118,322,000.

The high value of engineering production has been largely stimulated by war conditions. The lift in total production value from 1938-39 to 1949-50 is 315 per cent. However, the reader should appreciate the inflationary trends over this particular period in judging this remarkable increase.

Post-war industrial activity in Australia has been greater than in wartime, the essential difference being the requirement to produce articles at competitive cost in times of rising costs against the war economy of producing at any cost for national survival. The important features of this era have been the establishment of the Australian-made car and lorry. This can be considered important in the foundry industry in terms of both the production of automotive castings, and indirect production of castings for machine tools and appliances. General Motors have established a division, known as General Motors-Holden, which is producing two hundred and fifty vehicles per day of Australian origin, plus a quantity of partially-imported units. (Figs. 3 and 4.) Other vehicle manufacturers, such as Ford Company, International Harvester, and English firms, have made considerable progress towards the production of units from Australian materials, labour and techniques.

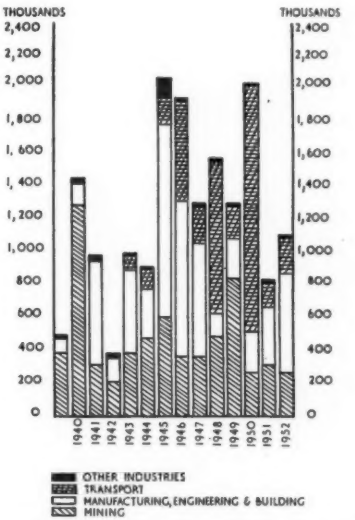


FIG. 2.—*Working days lost owing to disputes in industrial groups in Australia, from* 1939 *to* 1952.

Wages and Salaries

The total amount of wages and salaries paid in factories in 1950-51 was £492,000,000.[4] In the industrial metal, machines and conveyances group, the amount was £207,443,000 or approximately 42 per cent. of the total. During this period, the maximum ruling basic wage was £9, and the average weekly wage rates for adult males in the engineering trades ranged from £9 19s. 11d. to £11 17s. 1d.[4]

To-day the basic wage rate is £11 15s., so that the average earnings of the employee will be correspondingly higher. Considerable arbitration has been heard concerning an adjustment of the margins of payment over and above the basic wage

* Values throughout the Paper are given in Australian currency—one Australian pound equals 16s. sterling.—Editor

for additional skill. This is due to the fact that the original percentage margin for skill has not operated with the rise of the basic wage, and therefore, the percentage has decreased. The arbitration court has given an initial ruling, increasing the margin for skill for tradesmen, and at present, the exact margins are being determined for occupations requiring semi-skilled labour.

It would seem that the basic wage has become relatively stable and this is best shown in Table IV.[4] The female rates may be assessed as 75 per cent. of the male rate. Examination of Table IV will show that the greatest upsurge of wages was between November, 1948, and May, 1952, but since that period, the increases have been small and are now fluctuating about an average figure.

It is difficult to predict the effect of the margin increase on the basic wage, and it depends on whether industry can absorb the additional costs without passing them on to the consumer. If the public have to bear the extra costs, a rise of the basic wage in six months' time could be expected.

TABLE IV.—*Basic Wage: Weekly Rates, Capital Cities, Prescribed by Commonwealth Court of Conciliation and Arbitration for Adult Males.*

Date operative.	Sydney.	Melbourne.	Brisbane.	Adelaide.	Perth.	Hobart.	Six Capitals.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
September, 1939	81 0	81 0	76 0	78 0	77 0	77 0	79 0
December, 1946	108 0	106 0	101 0	102 0	102 0	103 0	105 0
November, 1949	132 0	130 0	125 0	126 0	129 0	128 0	129 0
November, 1950	146 0	143 0	135 0	137 0	139 0	139 0	142 0
December, 1950	165 0	162 0	154 0	158 0	160 0	160 0	162 0
May, 1951	180 0	177 0	166 0	171 0	176 0	173 0	176 0
November, 1951	207 0	199 0	185 0	195 0	197 0	199 0	200 0
August, 1952	235 0	224 0	213 0	224 0	222 0	222 0	227 0
November, 1952	237 0	228 0	216 0	229 0	228 0	230 0	231 0
February, 1953	238 0	229 0	215 0	225 0	229 0	232 0	231 0
May, 1953	241 0	232 0	217 0	228 0	231 0	239 0	234 0
*November, 1954	235 0	234 0	235 0	235 0	235 0	235 0	235 0

* November 1954 figures were issued by the Commonwealth Statistician. The Arbitration Court award was "frozen" in May, 1953

Prices

Prices in Australia to-day are at a record high figure, and only recently has there been any trend for prices to stabilize. The high prices are closely related to wages, costs, and drive towards a higher standard of living. This has affected the cost of basic engineering and foundry materials as is shown in Table V.[4]

The advent of the forty-hour week had a marked influence on the cost of material. This was made law from January 1, 1948, and it will be noted in Table 5 that the major increases of the cost of basic materials occurred after this date. However, this was not the sole cause of the price rise, since other factors, such as labour shortages, the shortages of essential commodities, and the other world-market prices, both of import and export articles, also exerted a major influence.

Prices were rigidly controlled by the Commonwealth Government from September, 1939, until May 29, 1948. At this date, the price-control system was handed over to the respective State Governments for the maintenance of the regulations and decontrol.

Transportation[5]

There are twenty principal ports listed around Australia. The major ports are Sydney, Melbourne, Adelaide, Brisbane, Fremantle and Newcastle. During 1949-50, the combined ports handled 19,229,000 tons discharged cargo and 14,074,000 tons shipped cargo.

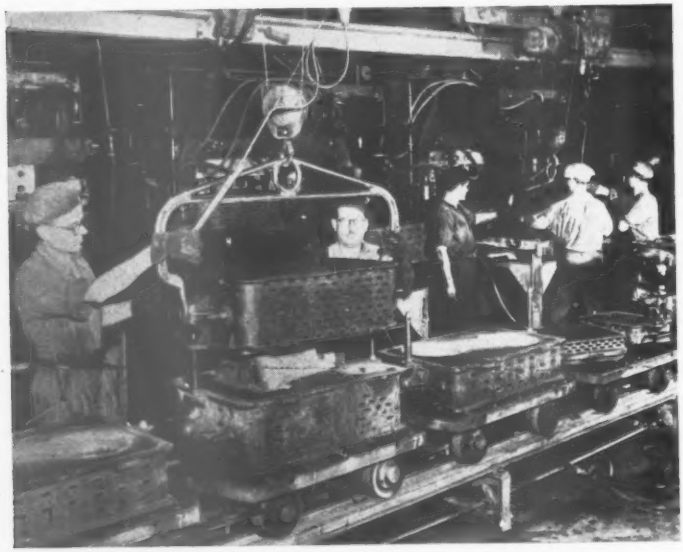


FIG. 3 (*a*).—*Mould-production line at General Motors-Holden, Limited, showing the closing of a transmission-housing mould; note ample use of mechanization.*

(Photo by courtesy G.M.H.)

TABLE V.—*Wholesale Price (Basic Materials) Index Numbers. (Base of Each Group: Average 3 years ended June 1939 = 100).*

Period.	Metals and coal.	Oils, fats, and waxes.	Textiles.	Chemicals.	Rubber and hides.	Building Materials.	Total.
1938-39..	103	100	82	101	92	97	99
1942-43..	129	167	147	142	138	163	149
1947-48..	146	161	283	148	126	190	166
1949-50..	214	184	434	187	143	225	214
1950-51..	256	196	641	242	292	268	264
1951-52..	343	220	577	314	298	370	321
June '52	379	230	570	331	296	433	349

The port of Melbourne is the most advanced, insofar as cargo-handling facilities. In the year mentioned, Melbourne handled 7,131,000 tons, Sydney 6,079,000 tons and Newcastle 3,980,000 tons. The interstate shipping figures show that Melbourne and Newcastle have the highest turnover. This is a reflection on the chaotic condition of the internal transport system in Australia. Newcastle is the major iron and steel port, and Melbourne is a major industrial port, but these two centres have only maritime and road connection; there is no direct railway link owing to a change of gauge.

The railway systems throughout Australia are probably a world oddity insofar as lack of standardization of gauge between States. Queensland and New South Wales are linked by a standard gauge line of 4 ft. 8½in. Queensland's internal services, however, are carried on a 3 ft. 6 in. gauge, and the same applies to Western Australia. Victoria maintains a 5 ft. 3 in. gauge throughout and is linked with South Australia. Western Australia and South Australia are joined by the Trans-Continental Railway, operated by the Commonwealth Government on a 4 ft. 8½ in. gauge. However, the internal rail systems within the States are rapidly being modernized, and extensive electrification projects are being carried out in Victoria and New South Wales. Despite the break of gauge between the various States, the weight of goods carried throughout Australia for the year of 1949-50 was 41,000,000 tons.

Transportation of raw materials has been, and still is, a very serious problem for foundries operating in Victoria, since the supply of coke, pig and steel for the industry is from New South Wales and South Australia. Victorian foundries have to have coke transported by road over a distance of approximately 600 miles, to avoid damage by the multi handling, due to the different railway standards. This means a higher cost must be paid for a more reliable product and supply. Shipping of coke is unreliable, except for large foundries, the consumption and storage of which, is such that complete shipments can be accommodated.

The Victorian Government is very alive to the transportation problem, and considerable progress has been made towards making Victoria a self-sufficient State in respect to coal and power. These problems apply to a lesser degree in South Australia, Queensland, Western Australia and Tasmania, since the degree of industrialization is not so great.

Summary

The simple objective of the preceding section is to illustrate the condition of the industry as a whole, and to enable the reader to envisage the foundry industry in relation to national activity. Australia has long played a part in world production, as a producer of wool, wheat and other raw materials, but the time is arriving when its secondary industries will also have some influence upon world markets.

BASIC MATERIAL AND POWER RESOURCES

Introduction

There are very few basic materials that are unobtainable from local sources in Australia, so that, to a large extent, the foundry industry is self-supporting and independent of overseas supplies. Graphite and nickel are two important materials which have to be imported; aluminium has been imported, but in the near future, the Australian Aluminium Production Commission will be producing aluminium at Bell Bay in Tasmania. This will be a progressive step in assuring the future of the light-alloy foundries and the aircraft industries.

FIG. 3 (*b*).—*Continuous-pouring line at General Motors-Holden, Limited. Metal is melted in two cupolas—63 in. and 96 in. dia. and duplexed in two acid-lined direct-arc electric furnaces.*

(Photo by courtesy G.M.H.)

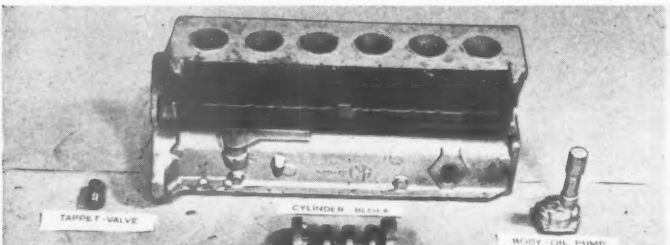


FIG. 4 (*a*).—*Typical group of castings made by General Motors-Holden, Limited, for production of the Australian car.*

(Photo by courtesy G.M.H.)

The trend of world economy is to control the prices and supply of basic materials for heavy industry, and therefore, the significance of these two factors is becoming minimized in respect to commercial users. However, there will always be a difference of quality between one source and another which will have a direct influence on the technique adopted by the local industry, and perhaps the cost of the final product.

Metal Resources

Pig-iron

The most important producer of pig-iron and steel is the Broken Hill Proprietary Company Limited, who supply about 96 per cent. of the pig-iron used in Australia. B.H.P. Company Limited has blast furnaces located at Whyalla, South Australia, Newcastle and Port Kembla, New South Wales, but the blast furnace at Whyalla produces the main pig-iron requirements. The annual capacity of this furnace is 218,000 tons.[5] (See Figs. 5 and 6.)

The increase of pig-iron and steel production by B.H.P. Company Limited over the past four years shows how the basic ferrous metal demand is being met. (See Table VI.[6]) Adequate production and stocks of pig-iron are available, and although the demand is increasing, there should be no difficulty of supply.[7]

TABLE VI.—*Pig-iron and Steel Production by B.H.P. Company Limited.*

	1950.	1951.	1952.	1953.
Pig-iron	262,458	738,877	843,712	905,292
Steel Ingots	684,947	757,064	822,715	959,986

The other source of pig-iron is from a blast furnace operated at Wundowie, Western Australia, by the State Government. This furnace is operated on charcoal and has a capacity of 15,000 tons per annum; the pig-iron has a low manganese and a high silicon content, and is limited in its application.[3]

The grades of pig-iron available in Australia are sufficient to meet all needs. It had been thought that the local irons were unsuitable for the production of spheroidal-graphite cast-iron, however, several foundries are successfully using the normal grades. Table VII lists the grades and compositions of pig-iron available from B.H.P. Company, Limited.

The pig-iron grades fall into two main categories—Standard Grade, which is low in phosphorus content, and Special Grade, which is high in phosphorus content. In the latter, the stove and bath irons are self-explanatory. A second subdivision of grades divides the irons into low and high silicon contents, *viz.*, plain, foundry, and softener, while an increase of grade number generally indicates a rise of silicon content and/or an alteration of the manganese content. The iron is chill cast in a standard three-notch ingot and weighs 42 lb. approximately.

The ruling price of pig-iron, C.I.F. capital ports in November, 1954, ranged from £18 7s. 6d. to £19 5s. This arrangement has the effect of stabilizing the prices in the various States so that no one State will have any advantage over another.

FIG. 4 (*b*).—*Holden special sedan produced by General Motors-Holden, Limited; over* 200 *cars come off production line each day, they are powered by a* 6*-cylinder engine developing* 60 *b.h.p. at* 3,800 *r.p.m.*

(Photo by courtesy G.M.H.)

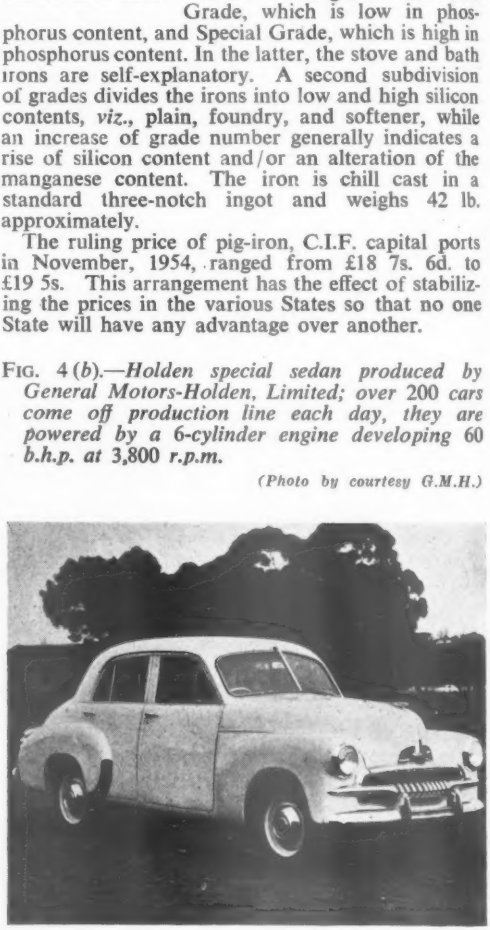


TABLE VII.—*Grades of Australian Pig-iron.*

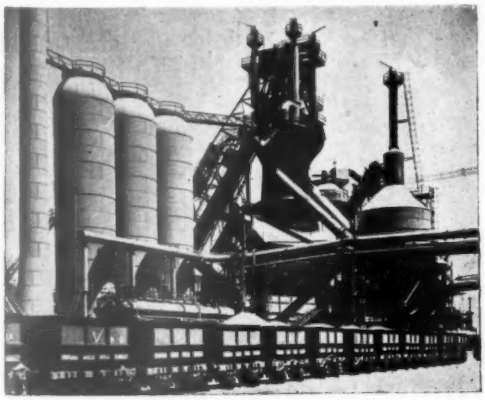
Pig-iron.	Chemical composition. (Per cent.)			
	Silicon.	Sulphur.	Phosphorus.	Manganese.
Standard grades.				
White iron ..	0.30–0.60	0.08 max.	0.30 max.	1.00–2.00
Chilling iron ..	0.75–1.24	0.05 max.	0.30 max.	0.60–1.50
Standard plain No. 1	1.25–1.74	0.05 max.	0.30 max.	0.60–1.50
Standard plain No. 2	1.25–1.50	0.05 max.	0.16 max.	0.60 max.
Standard foundry No. 1	1.75–2.24	0.05 max.	0.30 max.	0.60–1.50
Standard foundry No. 2	2.25–2.74	0.05 max.	0.30 max.	0.60–1.50
Standard foundry No. 3	2.20–2.60	0.05 max.	0.30 max.	0.60–1.50
Standard foundry No. 4	2.50–3.50	0.05 max.	0.08 max.	0.60–1.00
Standard softener No. 1	2.75–3.50	0.05 max.	0.30 max.	0.60–1.50
Standard softener No. 2	3.51–4.00	0.05 max.	0.30 max.	0.60–1.00
Special grades.				
Special plain ..	1.25–1.75	0.05 max.	0.40–0.70	0.60–1.00
Special foundry No. 1	1.75–2.75	0.05 max.	0.40–0.70	0.60–1.50
Special foundry No. 2	2.00–2.50	0.05 max.	0.40–0.70	0.60–0.90
Special foundry No. 3	1.75–2.50	0.05 max.	0.40–0.70	2.00–3.00
Stove iron ..	2.50–3.00	0.05 max.	0.40–0.70	0.60–1.00
Bath iron ..	2.75–3.25	0.05 max.	0.40–0.70	0.60–1.00
Special softener No. 1	2.75–3.50	0.05 max.	0.40–0.70	0.60–1.00
Special softener No. 2	3.50–4.00	0.05 max.	0.40–0.70	0.60–1.50

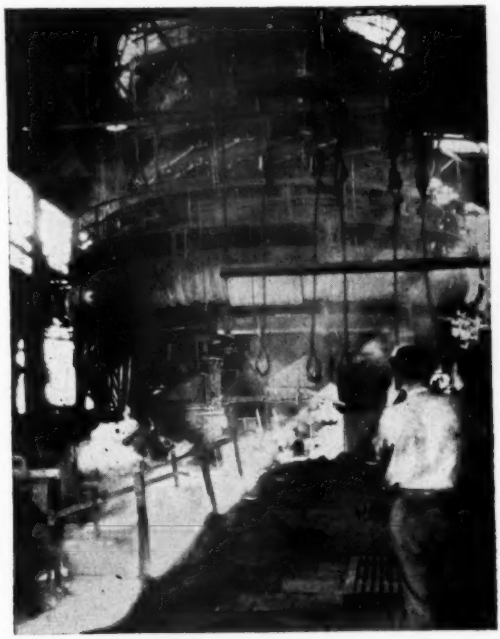
Copper

The production centres of electrolytically-refined copper are at Mt. Lyell in Tasmania and at Port Kembla in New South Wales. The copper plants at Mt. Isa and Mt. Morgan, Queensland, produce blister copper of which a percentage is shipped to Port Kembla for refining and the remainder is exported to the United States of America. Owing to the increased demand, about 85 per cent. of the blister copper exported is re-imported as refined copper.[5]

FIG. 5.—*Broken Hill Proprietary's blast-furnace at Whyalla, South Australia. Capacity of this furnace is 700 tons of basic pig-iron and 575 tons of foundry iron per day.*

(Photo by courtesy B.H.P.)





(Photo by courtesy B.H.P.)

FIG. 6.—*Tapping the Whyalla blast-furnace.*

The annual production of refined copper is 32,500 tons. This is very far short of the demand and it is necessary to import copper to meet the total requirements. The overall supply of local and imported copper for 1954-55 is expected to be 40,000 tons which is about 20,000 tons short of the estimated demand. The price was £335 per ton at the end of October, 1954; since the abolition of the Copper Price Equalization Pool, the price is expected to follow that of the London Metal Exchange.

The demand for copper and copper-alloys could reach 75,000 tons annually. The main increase in the demand of copper is for electricity and water systems which are being expanded in all States. It will be some time before Australia is commercially independent of copper imports. However, the industry and resources are great enough to cope with a national emergency.

Lead and Zinc[6]

Australia possesses excellent deposits of silver-lead-zinc minerals, and the mining and refining of these ores has been highly developed. The major deposit of ore is located at Broken Hill in New South Wales, where the ore is predominantly sulphide, and four companies are concerned in operating various sections of this lode. The lead and zinc ores are separated by a flotation process, prior to shipment to the refining plants in the other States. The lead ore is shipped to Port Pirie

in South Australia, where it is smelted to produce lead bullion, after which it is refined for the recovery of gold and silver, and the elimination of arsenic and antimony. This plant is unique for its continuous refining process and was designed on a theoretical basis by Australian metallurgists who formulated an entirely new concept of lead refining. The zinc-ore concentrates are also shipped to South Australia where by-product sulphur dioxide from the roasting processes is utilized for the production of sulphuric acid. Calcined ore is then sent to Risdon in Tasmania.

In Queensland at Mt. Isa, lead-silver-zinc ore is mined and refined into lead bullion; the production from this centre is exported. In 1949, all the zinc and 87 per cent. of this State's production of silver and lead were from Mt. Isa. The other principal mines are located in Tasmania at Roseberry (zinc ore) and Mount Farrell (silver-lead ore).

The Electrolytic Zinc Company of Australia, Limited, operates a large plant at Risdon, near Hobart, for the refining of ores from all parts of Australia, together with the production of quantities of secondary alloys based upon these metals. In 1949, Australia rated third and fourth in the world production of lead and zinc with an annual output of 213,491 tons of lead and 181,998 tons of zinc. Owing to international control of metals, lead and zinc have been restricted in supply from time to time; however, recently these metals and their alloys have become most readily available.

Ferro-alloys[3, 9]

During the last war, B.H.P. Company, Limited, installed a plant at Newcastle for the large-scale manufacture of ferro-alloys, and since, has become the major source of these metals in Australia. The Commonwealth Carbide Company in Tasmania has produced small quantities of ferro-silicon, and larger quantities of calcium silicide which is available for metal-treatment processes. The B.H.P. Company, Limited, has installed three 4,500 kva capacity furnaces, using the continuous Söderberg-type electrodes. In addition to the electrothermal plant, there is an aluminothermal section and a chemical plant for the production of tungstic acid for subsequent reduction to tungsten powder.

Ferro-silicon, ferro-manganese and ferro-chromium alloys are produced in quantities by the electrothermal process, while manganese metal and ferro-titanium are made in the aluminothermal plant. Ferro-silicon-zirconium is made in small quantities by the electrothermal process, and the usual grade consists of 35 to 40 per cent. zirconium and 40 to 45 per cent. silicon. This alloy is considered important in Australia, since it can be used as a partial substitute for vanadium in certain steels.

Australia has to rely upon the importation of a number of ferro-alloys and these include ferro-molybdenum; nickel metal and shot cobalt and ferro-vanadium. In addition, high grade chromium and manganese ores are imported to augment the local supplies. Most of the ferro-alloy distribution has been governed by the International Materials Conference, and therefore, the supply has been restricted. Recently, the production of these alloys has not kept up with the increasing demand, and ferro-chromium and ferro-manganese will have to be imported to meet the foundry requirements, since the bulk of B.H.P. Company, Limited, production is being used in the steel-making plants. The demand for ferro-alloys is difficult to estimate, but Table VIII gives some guide to the ferrous foundry usage in 1952.

TABLE VIII.—*Consumption of Ferro-alloys.*

Alloy.	Consumption in tons.
Ferro-silicon	3,500
Ferro-manganese	3,000
Ferro-chromium	500
Ferro-molybdenum ..	70
Nickel	325

There has been a steady rise of ferro-alloy manufacturing costs, and in some instances, this has had an important effect on foundry economics. Very careful consideration is given these days to the use of these alloys, and where possible, to a reduction of alloy content in final casting. The current prices of the common ferro-alloys are set out in Table IX.

TABLE IX.—*Costs of Ferro-alloys.*

Alloy.	Cost per ton.
Ferro-silicon (75 per cent. grade)	£90
Ferro-manganese (70 per cent. grade)	£110
Ferro-chromium (65 per cent. grade)	£120
Ferro-molybdenum (73 per cent. grade) ..	12s. per lb.
Nickel "F" shot	7s. per lb.

Fuel Resources

Hard Coke

The major production of hard coke in Australia is for smelting purposes and only a small proportion of the production is available for the foundry industry. The modern by-product recovery coking ovens operated by B.H.P. Company Limited and Australian Iron and Steel Limited have a total capacity of 1,700,000 tons per annum. Foundry supplies, however, are drawn from six coke producers who use the old-style beehive-type of oven.

The estimated demand for hard coke is shown in Table X.

TABLE X.—*Estimated Minimum Demand for Hard Coke (excluding Steel Works Production) Australia, 1951-52 and 1955.*

Industry.	1951-52.		1955.	
	Tons.	Per cent.	Tons.	Per cent.
Iron and steel foundries ..	101,000	44	120,000	36
Non-ferrous smelting and refining	94,000	42	175,000	53
Miscellaneous (including heavy chemicals) ..	31,000	14	35,000	11
TOTAL	226,000	100	330.000	100

The capacity of the commercial coke producers is approximately 207,000 tons of hard coke per annum,[10] therefore, the supply has to be augmented by imports to meet the demand. The commercial coke-producing companies are situated on the coal fields in New South Wales and Queensland, so that the supply of coke to the other States involves considerable transportation difficulties, and from time to time, the foundry industry in Victoria and South Australia has suffered serious set-backs, due to lack of supply by causes beyond their control. Excessive handling of Australian cokes materially reduces the quality and yield of a given shipment, and losses of 25 per cent. due to coke breeze, have been experienced by many foundries in the remote States. In Western Australia shipments of English or German coke have been preferred as being of better quality and of more reliable supply.

There does not appear to be any likelihood of improvement in coke quality in the near future, and attempts in the past to obtain some measure of quality comparable with overseas cokes have not met with any universal success. A recent development in Victoria has been the experimental production of metallurgical coke from brown coal of which Victoria has unlimited quantities suitable for opencast mining. It is planned that, in 1970, this State will be independent in respect to coal, coke, electricity and various petroleum products by the exploitation of the brown-coal fields.

Table XI shows typical analyses of Australian cokes and it will be seen that the over-riding bad feature is the ash content, which is both high and variable.[11] The No. 1 and No. 3 seams shown have been selected as the most suitable for the production of metallurgical hard coke.

TABLE XI.—*Properties of Australian Cokes.*

Oven.	Coking time, hours.	Coal.		Physical tests.		Proximate analysis.*		Sulphur.	Phosphorus.
		No. 1 seam.	No. 3 seam.†	Shatter.	Porosity.	Ash.	Volatile matter.		
		Per cent.	Per cent.	(+ 2 in.)	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
By-product ..	14½	90	10	62 (57/67)	41 (40/44)	18 (15.6/19.4)	0.8 (0.3/1.5)	0.4	0.06
By-product ..	16	75	25	70 (61/76)	43 (41/45)	18 (17.3/20.5)	1.1 (0.5/1.8)	0.4	0.05
By-product ..	17½	70	30	74 (64/80)	42 (41/43)	19 (17.7/21.2)	1.1 (0.4/1.8)	0.4	0.05
By-product ..	19	90	10	71 (63/79)	42 (41/44)	18 (17.2/20.0)	0.8 (0.3/1.5)	0.4	0.0
By-product ..	24	45	55	87 (84/89)	44 (43/44)	20 (18.2/20.6)	0.6 (0.4/0.9)	0.4	0.04
By-product ..	14/17	—	100	70 (65/77)	45	20	0.5	0.5	0.01
Wongawilli ..	50/60	—	100	86 (80/91)	50 (48/52)	20 (18.3/21.9)	0.5 (0·3/1·9)	0.5	0.01
Beehive A ..	72/96	100	—	86 (72/92)	40 (38/42)	14 (13.7/15.1)	1.2 (0.6/1.8)	0.4	0.06
Beehive B ..	72/96	100	—	76 (67/83)	40 (37/44)	15 (13.4/17.5)	0.7 (0.5/1.3)	0.4	0.06
Beehive C ..	72/96	100	—	84 (77/91)	42 (41/44)	17 (16.5/18.6)	1.4 (0.4/2.5)	0.4	0.06
Beehive D ..	72/96	100	—	85 (84/88)	49 (46/51)	14 (12.3/15.1)	0.9 (0.4/1.4)	0.4	0.06

* Dry basis. † Cleaned.

The price of coke, unlike pig-iron, varies from State to State. For example, the value quoted for November, 1954, f.o.r. Melbourne, Victoria, was £8 4s. per ton. Australian cokes are characterized by a high ash-content. This is due to both the high combined ash of some coal seams used and the high free ash due to the lack of coal washing.

The advent of mechanized collieries has further worsened the quality of the coke. The total ash-content commonly reaches 20 per cent. and this directly effects the efficiency of cupola operation. Generally, low metal to coke ratios are required to obtain good melting conditions. In turn, the high ash and high coke ratios necessitate additional fluxing materials with resultant shorter refractory-lining life.

The poor coke quality is not a serious problem for foundries producing the medium silicon and carbon cast-irons suitable for machinery castings. However. in the field of high silicon and high carbon cast-irons which require high pouring temperatures, considerable difficulty can be encountered in maintaining control of the process and the production of uniform quality.

Electric Power[12]

Until recently, the electric power supply in most States has been inadequate, and in Victoria and New South Wales, power rationing has been enforced during winter peak-loading periods. To cope with this restriction, a number of firms installed auxiliary generating plants and there were well-organized systems of operating these plants to feed back into the main system.

However, during the past year, the electrical authorities in all States have, to a large degree, rectified this situation, and power-generating plants which have been under construction since the war are now coming into operation.

It is difficult to obtain accurate forecasts from the electrical authorities, but in all cases, assurances were given that all industrial power requirements would be met. The main problem now applying to the heavily industrialized centres is the distribution of power, and power cannot be supplied to some plants until additional cables are installed. Such an obstacle can face a foundry desiring to instal an electric furnace, since this type of equipment normally imposes a heavy local and intermittent load on an electrical system. The increase

in power consumption has been considerable, and in Victoria, a rise of 16 per cent. was recorded for 1953-54.

The cost of power is variable. The kilowatt per hour unit cost operates on a diminishing scale with increased usage. Heavy consumers can obtain special ratings for a maximum loading of 500 kilowatts (in Victoria, the rate is £1 6s. 8d. per month for each kilowatt of maximum demand, plus 0.7d. per kilowatt hour energy charge for all consumption) and this is an advantage to foundries operating electric furnaces. There is every indication that the cost of electrical power will be reduced. During the last year, small reductions have been made; however, no information could be obtained regarding the extent of future reductions.

The power supply has not been standardized throughout all States, but the majority of States supply the low tension at 200 to 240 volts and 50 cycles.

Gas[12]

Australia has no working sources of natural gas, and therefore, the gas supply is based upon the conventional methods of retorting black coal. The main source of gas coal is in the Maitland district of New South Wales, and it is from this field that all the major gas-manufacturing companies receive supplies. The other States are, therefore, dependent upon New South Wales mines for gas coal.

Except in New South Wales, the development of gas for industrial purposes has been retarded. The reasons for this are: (*a*) coal shortages and rationing, due to mining disputes, (*b*) coal shortages. due to transport disputes, and (*c*) the high cost of manufactured gas. The lack of reliable gas supply in Victoria has been acute in the past and there have been numerous occasions when gas for industry has been temporarily banned.

Comparing the commercial and industrial gas sales for 1953 in the various capital cities, it will be seen that the Sydney consumption is double that of Melbourne and more than 50 per cent. of the Commonwealth total. (See Table XII.)

TABLE XII.—*Commercial and Industrial Gas Consumption.*

City.	Industrial and commercial gas used, × 1,000 cub. ft.
Sydney	3,505,499
Melbourne	1,288,107
Brisbane	316,857
Adelaide	514,499
Perth	532,263
Hobart	45,410
Commonwealth	5,202,635

The charges for gas operate on a diminishing rate for increased consumption. For example—a typical charge is 16s. for the first 1,000 cub. ft., ranging down to 13s. 7d. per 1,000 cub. ft. for a consumption over 5,000 cub. ft. The declared calorific value of the gas varies, and ranges from 478 to 546 B.Th.U. per cub. ft. The average value is in the order of 500 B.Th.U. per cub. ft.

Victoria is developing a brown-coal gasification plant which will supply both rural and urban areas. It is expected that, by 1958, this State will become independent of New South Wales coal supplies and be able to supply gas at a rate competitive with other fuels for industrial applications.

Oil

Oil fuel has been widely adopted for the firing of crucible furnaces, annealing furnaces and core ovens in all classes of foundries. Despite the fact that oil is imported, it has been found to be more reliable and cheaper than gas or electricity. In 1942, it was necessary to convert large numbers of gas-fired furnaces to oil firing, because the demand on the local gas was far in excess of supply. This conversion to oil firing has been maintained over the years and will continue until the supply position of the local fuels has been completely restored.

(To be continued.)

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Scottish Fuel Economy Drive

Industrial consumers of coal in Scotland are being reminded by the Scottish Fuel Efficiency Committee of the importance of training boiler operators this autumn so that they may become expert in saving coal, gas, electricity, or oil. A Scottish survey of 953 plants made in the past 11 months revealed that the companies concerned could save 26 per cent. of their present coal consumption, which would be equal to an economy of almost 300,000 tons a year.

Sir Patrick Dollan, chairman of the committee, stated at Glasgow that there were 8,000 companies throughout Britain which consumed 1,000 tons of coal or more a year and some 14,000 which consumed from 100 to 1,000 tons a year. About one eighth of these companies were in Scotland, and it was estimated that the majority of industrial concerns could save from 18 to 25 per cent. of their fuel consumption if they adopted new firing methods.

K. & L. STEELFOUNDERS & ENGINEERS, LIMITED—Mr. F. Simmonds has been appointed financial director and secretary of the company.

Metal Melting Furnaces*

By F. C. Evans, F.I.M.

In the Author's view, the question of metal melting furnaces can be considered under three headings:—(1) Metallurgical considerations; (2) economic considerations, and (3) practical considerations.

Metallurgical Considerations

One of the main requirements in an alloy is soundness, which meant avoiding gas pick-up; the furnace has a very big part to play in this. Hydrogen can be picked up from water-vapour in the gases used in heating furnaces and when using oil firing there is the question of sulphur pick-up as well. Furnace design is important in avoiding this.

The reverberatory furnace, in which the products of combustion pass over the bath of metal having a comparative large area and small depth, is prone to gas pick-up. Crucible furnaces are better in this respect, in that the bath of metal is deep and the surface area small. If freedom from gas is very important, the use of electric furnaces—in which there are no products of combustion to contaminate the metal—should receive serious consideration. However, there are other means of gas contamination—the metal charge may be damp, the atmosphere contain water-vapour and moisture may also be picked up by the metal from moulding sand.

Many founders now use gas-scavenging methods or oxidizing fluxes to keep the metal gas-free. Crucible and electric furnaces are adaptable for this method, on account of the depth of the metal bath, but reverberatory furnaces with their shallower bath are not so suitable. If a foundry is seriously concerned about gas pick-up, then the crucible furnace is probably the best, apart from the electric furnace.

Other considerations when melting are ease of control and the attainment of uniformity in the alloy. When melting high-lead alloys, as lead is liable to settle out, some form of stirring has to be adopted. The electric furnace, particularly the high-frequency type, is ideal for this work due to the motion introduced by the current. With an alloy containing 15 to 30 per cent. lead, the high-frequency electric furnace has been found to give satisfactory uniformity without external stirring. Similar results have been attained in alloying aluminium-bronze.

In foundries melting a number of alloys, contamination of a charge by the one previously melted has to be avoided; this is very difficult with electric and reverberatory furnaces, particularly if aluminium-bronze, manganese-bronze and gunmetal are being used, so that with reverberatory and electric furnaces it is most desirable to keep to one alloy in each furnace. For those using a number of different alloys, the crucible furnace is ideal from this point of view, because the crucible can be changed when a different alloy is to be melted. With the growing use of nickel-base alloys, higher melting temperatures are required; with oil-firing, crucible furnaces temperatures exceeding 1,400 deg. C. are difficult to obtain and indirect arc or h.f. electric furnaces are necessary.

Economic Considerations

The main economic consideration nowadays is not fuel cost but keeping metal loss to a minimum. With metals costing £300 to £400 per ton, 1 per cent. metal loss can equal the cost of melting and it is therefore important to consider how to keep this loss at a minimum. Many factors affect metal loss, and the relative importance of such losses—based on fuel prices in the year 1949 and taking the total loss in 1949 as 100 per cent.—are set out below:—

	Oil-fired crucible.	Coke-fired crucible.	Electric l.-f. induction furnace.
Metal loss	55	56.5	28.8
Fuel	21.2	14.04	36.3
Maintenance	23.8	18.66	5.9
Total	100.0	89.2	71.0

From these figures, it can be seen that with an electric furnace only half the metal loss is sustained in comparison with the other furnaces and that maintenance is much lower, although the cost of fuel is considerably higher. With a reverberatory furnace, the loss is usually much higher than that shown for crucibles. The Author is of the opinion that much could be done to improve the design of crucible furnaces and to cut down metal losses arising from spillage.

Fuel Costs

Efficiency data for various types of furnaces are shown in Table I. It appears there is much room for increased efficiency in the use of fuel. In spite of metal loss being the chief feature which has to receive the attention of the founder, it is important from the national point of view that fuel which is already in short supply and will probably be even shorter and more expensive, shall be used economically. From the information given in Table I, it is clear that natural-draught coke-fired furnaces are the most inefficient, with forced draught the efficiency is improved, and oil-fuel-fired furnaces seem to be superior. In addition, there is much that can be done in recovering heat which up to the present is being wasted in the hot gases going up the chimney stack. Ironfounders, by means of hot-blast cupolas and the like, are endeavouring to recuperate heat from gases leaving the cupola and possibly something similar can be done with hot gases from furnaces in non-ferrous foundries, which might result in fuel savings up to 25 per cent.

* Address delivered to a "Conditional Aid Service" meeting arranged by the Association of Bronze & Brass Founders for London-area Founders. The Author is associated with Metallurgical Engineers Limited.

Metal Melting Furnaces

Capital Cost

Although the cost of melting has been considered earlier, the capital cost involved has not been considered. This, especially with the electric furnace, can be very considerable and is unjustified unless adequate use can be made of the furnace. Electric furnaces have to be used more or less continuously to justify the capital outlay. Rough comparisons of the initial cost ratios are then as follows:—

Crucible tilting furnace	1
Reverberatory furnace	2
Electric furnace (l.-f.)	2.75
,, ,, (h.-f.)	16
,, ,, (indirect-arc) ..	4.75

The low-frequency electric furnace has to have a bath of molten metal to begin with and it is imperative that it is used continuously, but the high-frequency furnace can be used intermittently; both need large outputs to be economic. Other factors which have to be taken into account in melting practice, are those depending on the layout of the foundry, the space available and the requirements of ease of working.

DISCUSSION

When the Chairman (Mr. W. R. Buxton) opened the meeting for discussion the question was asked whether reverberatory furnaces could be scoured by an oxidizing flame so that subsequent charges were not contaminated from earlier charges. It was said that this could be done, but that it meant that the metal was oxidized and lost up the stack which was rather expensive.

MR. E. C. MANTLE said that in using leaded alloys it was found that the lead soaked into the brickwork of the furnace and was very difficult to get rid of.

MR. EVANS agreed with this, but said he had been thinking of aluminium and did not consider that that contamination need worry most foundrymen. Reference was made to melting manganese-bronzes after aluminium; many hours' scouring had not eliminated the contamination.

MR. A. R. PARKES said that the suggested use of recuperators was intriguing and enquired whether waste heat had been recovered by this means in practice on small non-ferrous melting units.

MR. EVANS replied that this had been done in an aluminium foundry of fair size and waste heat had been recuperated from forging furnaces which were in many respects similar to metal-melting furnaces. The recovered heat had been used to pre-heat air for the oil burner. Mention was also made of core stoves heated by waste heat.

MR. MANTLE pointed out the difficulty of back pressure building up in a recuperator which involved the use of energy to force gases into the chimney. The matter was one of delicate balance.

MR. EVANS said that with a good draught caused by an efficient stack the difficulty could be overcome.

Coke Quality

MR. WEBSTER drew attention to the present poor quality of coke, Durham cokes now appeared inferior to the qualities supplied before the war. The furnace linings were badly attacked and would not stand up to present cokes. This was a big problem for founders melting by coke and who were not able to take advantage of oil firing. He urged that there should be standards for coke and inquired whether the Association could do something about it.

MR. EVANS pointed out that ironfounders had the same problem with coke for their cupolas and for them it was of greater significance as alternative fuels were not available. There were at present no specifications for coke and the Institute of British Foundrymen had a sub-committee considering the matter.

MR. PARKES said he doubted if coke would be forthcoming to standards laid down. He did not think there was much possibility of producing better grade coke for the foundry industry; especially as much of the coal now available was not of a suitable quality to produce coke of pre-war standard. As to supplies, he understood that in spite of other fuels, foundry coke sales were breaking records.

MR. BUXTON said that Mr. Hudson, who was unable to be present that evening, wanted to know if there was any reason why crucibles in certain types of tilting furnaces should not be ported at

TABLE I.—*Fuel Consumption and Comparative Efficiency of Various Types of Furnaces.*

Type of furnace.	Fuel.	Draught.	Capacity, lb.	Alloy.	Fuel consumption, per ton.	Efficiency, per cent.
Pit; crucible	Coke	Natural	150	Gunmetal	0.40–0.66 tons	5.5–3.0
,, ,, ...	Town gas*	Forced	150	,,	8,200–13,100 cub. ft.	16–10
Tilting; crucible	Coke	Forced	600	,,	0.18–0.22 tons	12.5–10.0
,, ,, ...	Fuel oil	Forced	600	,,	26–33 gall.	18–14
Fixed; reverberatory	Coal	Natural	1,200	,,	0.29–0.39 tons	8–6
,, ,, ...	Fuel oil	Forced	1,200	,,	15–18 gall.	32–26
		(preheated)				
Rotating; reverberatory	Fuel oil	Forced	1,000	,,	16–21 gall.	30–22
Indirect-arc	Electricity	—	300	,,	400–500 kwh	49–39
Rocking-resistor	,,	—	300	,,	350–450 kwh	56–43
Low-frequency induction	,,	—	1,200	Brass	210–240 kwh	83–72
Coreless-induction (high-frequency)	,,	—	600	Nickel/chrome	675 kwh	48
Direct-arc	,,	—	3,000	Nickel	600 kwh	54

* 1 cub. ft. = 500 B.Th.U.

the top so that the hot gases flowed over the metal instead of going directly up the flue. It was understood that this had been done for many years in certain foundries and had effected fuel economies up to 25 per cent. and lengthened the crucible life (see Figs. 1 and 2).

MR. MOORE pointed out that this militated against melting in a good atmosphere and it was necessary to balance metal loss against fuel economy.

Sulphur Pick-up

MR. LANCASTER referred to sulphur pick-up—coke was very expensive and oil was being used more and more for melting. The oil now supplied was not the gas oil used in the past but heavier types with up to 4 per cent. sulphur. He inquired whether anyone knew of methods of removing sulphur and if anyone had tried additives to the oil. He pointed out that the new B.S.·1400 alloy specifications would set limits for sulphur, a figure of 0.08 per cent. had been suggested, but he thought it is not uncommon to pick up 1.5 to 2.0 per cent.

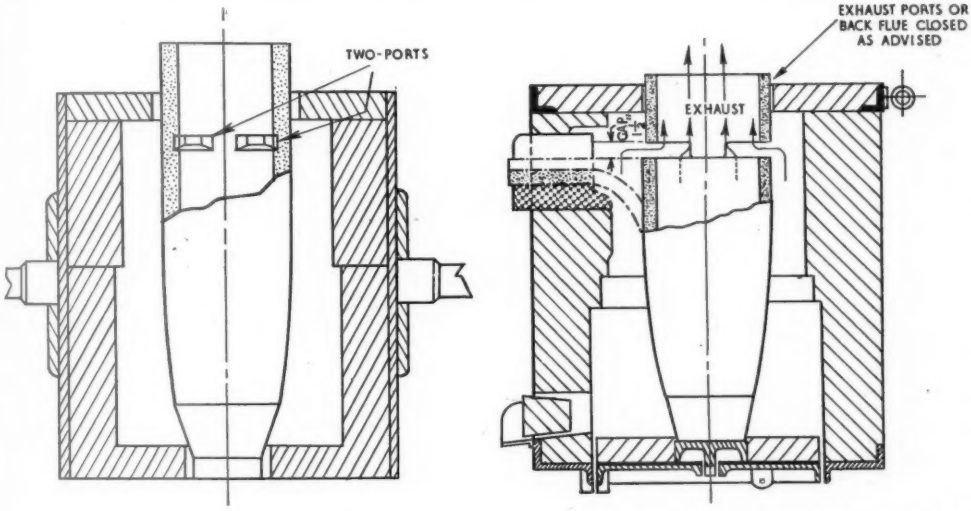
He emphasized the point made by Mr. Evans, comparing fuel losses with metal loss. The melting cost for fuel in 2 to 3 ton melts was of the order of £3 per ton but at present prices the lowest metal cost was about £280 per ton, consequently the saving of a very small percentage of metal far outweighed melting cost. A rotary furnace, if of the continuously rotating type used with a heavy flux cover, could cut metal losses by at least 50 per cent.

MR. EVANS agreed that the rotating reverberatory furnace was much better than a fixed furnace. With regard to sulphur, he said that many methods of "fixing" it in slags had been tried but that in his experience users had been forced to employ low-sulphur oil.

In a discussion on sulphur, the importance of ascertaining the effect of this element on alloys was emphasized and attention was drawn to the absence of reliable evidence on this subject. If low limits were insisted upon, the cost of producing these alloys would be affected and would be passed on by the ingot maker to the founder.

MR. MOORE, referring to rotary furnaces, said these suffered from the disadvantage of the furnace being heated through the metal and some parts becoming overheated. He described investigations he had carried on in melting manganese bronze in which he took temperatures at various levels five minutes after stirring; the surface temperature was 1,070 deg. C., which was deleterious, as it was near flaring point but 6 in. below the surface the temperature was 950 deg. C. only. He was therefore very interested in the possibility of an induction stirrer with large melting units.

MR. EVANS agreed with these remarks but pointed out that with the rotary-furnace, heating was effected by two means, there was direct radiation to the metal and also the flame heating the roof of the furnace, which, as it rotated heated the metal in the bottom of the bath.



(Courtesy, Morgan Crucible Company Limited)

FIGS. 1 AND 2.—*Two examples of modified crucible design incorporating ports for pre-heating the top charge.*

Continuous Supplies of Metal

Reference was made to the use of the cupola in ironfounding which furnished a continuous supply of molten metal; there was nothing similar in the non-ferrous foundries and it was voiced that it would be most useful if something could be developed.

Metal Melting Furnaces

MR. MANTLE expressed the view that perhaps non-ferrous founders had not been sufficiently adventurous. He was interested in the remarks concerning rotary reverberatory furnaces and thought perhaps such firms as the big valve founders, whose production was limited to a few alloys, might well use such furnaces in conjunction with holding furnaces instead of using large tilting crucible furnaces.

Attention then turned to crucible life, MR. HUDSON had expressed the view that to judge the life of a crucible by the number of melts was an unsound basis and that the proper basis was the number of melts multiplied by the time taken by each melt.

MR. PARKES pointed out that the number of coolings could also have a big effect on crucible life and it was thought that there was still a lot of work to be done on crucibles.

MR. LANCASTER gave his experience of redesigning the combustion chamber for the use of oil fuel to allow more room for the flame and to adjust the flame so that it was of a spreading nature, thereby cutting out the hot spot on the crucible: by these means much improvement in crucible life could be obtained and he found that with phosphor-bronze 110-120 heats were quite possible from a crucible. Reference was made to the rotary crucible furnace which had been found very useful in melting-down swarf and residues.

This brought the discussion to a close, and MR. LANCASTER moved a vote of thanks to Mr. Evans for the talk which he had given, saying that he was already well known to many of them and he could always be relied upon to put forward worthwhile views.

Exporters to Australia

To United Kingdom exporters who may ask if Australia's import restrictions are permanent, and why Australia cannot expand her exports to make up the deficiency between imports and exports, the latest "Economic Survey of Australia" sets out to explain that the Commonwealth is a "rapidly developing country with a high standard of living and a high wage and cost structure. . . . The high wage rates have necessarily added to the cost of production in manufacturing industries." Australia's manufacturing costs are, in general, high, it is pointed out, and this means that her secondary industries can make no substantial contribution to her export earnings.

Discussing the possibilities of the relaxation of these import restrictions, the survey, while not making any forecast, says:—"There are clearly great potentialities for an increase in the production of commodities and of goods for export from Australia, but this can only occur if the question of rising costs is dealt with resolutely and with success.

Despite the restrictions, however, UK exporters still retain the major interest in the Australian market, apart from domestic manufacture. In 1953-54, imports from the UK were worth £A333,300,000, or nearly half the total; those from the United States were £A71,900,000; and from no other country were they much more than £A20,000,000. High on the list of principal commodities exported from the UK were machinery, excluding electrical; metal manufactures, and motor vehicles and parts.

Dealing at length with the changing pattern of Auslian industry, the survey shows that the wide range of home products now includes internal combustion engines (Diesel and petrol), motor vehicles and accessories, railway engines, aircraft, and coastal cargo ships. UK firms are participating directly in this industrial expansion—through, for example, the establishment of subsidiaries in Australia—especially in the fields of oil refining, motor vehicles, and chemicals production. The United Kingdom is, in fact, the main source of overseas private investment.

The survey lays particular stress on the Snowy Mountains Hydro-electric Scheme, the most ambitious of all Australia's projects, and shows that annual expenditure on the project is running at the level of nearly £A14,000,000. When completed, its power stations will have an installed capacity of 3,000,000 kw.

Metallurgist for Iran

Mr. Axel Hethey has accepted an appointment from the United Nations technical assistance administration as an expert in metallurgy to Iran. The appointment, which was made at the request of the Government of Iran is part of the programme of the United Nations and the specialized agencies to assist less-developed countries in solving their industrial development problems and to raise their standards of living. Mr. Hethey's appointment is for one year. While in Iran he will be especially concerned with malleablizing cast iron, case-hardening and heat-treatment. He will give advice to about 30 enterprises on case-hardening and to 15 other enterprises on tempering and heat-treatment installations. He will also conduct technical courses in case-hardening, heat-treatment and tempering for shop superintendents and foremen.

Mr. Hethey has had long experience in the field of metallurgy and engineering. From 1952-54, he was a United Nations expert on the heat-treatment of steel in Yugoslavia. In addition to independent work as a consulting engineer and consulting metallurgist, he has been (1946-49) president of the B.C. Tube Works, Limited, Vancouver, B.C., Canada; managing director (1919-1926) of the Anglo Brazilian Iron & Steel Syndicate, Limited; and director (1917-1919) of the United Tube Corporation, Limited, Newport. Mr. Hethey holds a B.Sc. in metallurgy from London University; is a member of the Iron and Steel Institute; a Fellow of the Royal Society of Arts; a member of the Canadian Institute of Mining and Metallurgy, and of the American Foundrymen's Association.

Unemployment Lowest Since War

Unemployment in July reached its lowest level since the war. On July 11, the number of unemployed was 185,000, including 19,000 temporarily stopped.

This represents only 0.9 per cent. of the total number of employees, compared with 1 per cent. in June and a year ago. Of the 78,000 wholly unemployed, 47 per cent. had been out of work for more than eight weeks.

At the end of June the working population stood at 23,870,000, 200.000 more than in June last year. There was a fall of 2,000 in the number of wage-earners on colliery books in June. Metal manufacture showed a loss of 1,000, vehicles gained 1,000, and the engineering, metal goods, and precision instruments group recorded a decrease of 1,000.

Chill Testing*

By A. P. Alexander

In a short Paper on chill testing of cast iron, with some reference to inverse chilling, it is only possible to touch upon aspects of the subject. Of necessity a great deal of relevant matter is omitted.

Chill testing is a rapid means for determining the carbide stability of cast iron and may, therefore, be used with success in checking on melting operations and controlling the structure of castings. This method of testing shows the combined effect of melting practice and chemical composition and to use it with success it is imperative that melting conditions be controlled, thereby reducing the variable to one factor. Chill testing may, of course, be used to assist in the establishment of definite melting conditions but to achieve success in structure and hardness control of castings it is necessary to melt under these conditions.

The term "chill testing" is loosely applied and for terms of specific reference should be divided into

(*a*) the casting of a test-piece into a wedge-shaped slot in a runner cup without the use of a chill plate. This is "wedge testing";

(*b*) the casting of a test-piece into a slotted runner cup, one face of the casting being against a chill plate. This is "enforced chill testing."

Purposes Served

Whilst the principle differs, the objective is the same and it is, therefore, not proposed to discuss the one method only. Chill or wedge testing of cast irons may be introduced for :—

(i) Assessing the suitability of the molten material for a specific casting, *i.e.*, heavy, medium or light section. This will be the case where melting conditions are not stabilized or where irons of different chilling characteristics are deliberately or accidentally melted in a cupola during one "blow."

(ii) Determining the actual chill on the finished casting where the design calls for a chilled area of specific depth.

(iii) Determining or controlling the quality of the iron which may be sub-divided into irons of (*a*) uniform machinability; (*b*) uniform mechanical properties—as in the case of high-strength processed irons.

It must be emphasized that irons of the same chilling tendencies do not necessarily have identical mechanical properties. This method of testing does, of course, envisage and—in all the more specialized applications—require the use of ladle additions by way of carbide stabilizers or inoculents, the control of which is carried out by means of chill or wedge test.

In determining which method should be adopted, it is necessary to consider the material to be controlled and the degree of control as indicated above.

So far as material is concerned, it is proposed only to touch on the influence of carbon and silicon, being the two most important elements that influence the strength and chilling characteristics of grey iron. The effect of these elements on depth of chill are summarized in the findings of Burgess and Bishop† who established the marked effect on silicon, particularly for the lower-carbon irons; also that the effect of carbon varies with the silicon content in that at low-silicon contents the influence of carbon on chill depth is much greater than at higher silicon contents. This is illustrated in their graphical relation in Fig. 1.

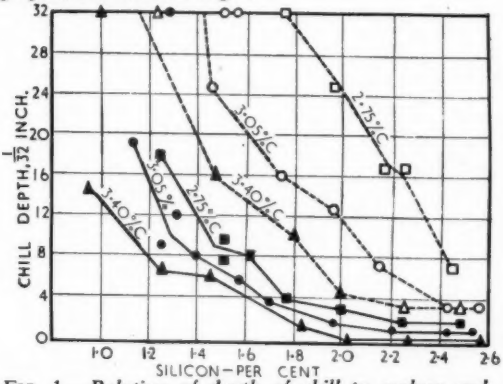


FIG. 1.—*Relation of depth of chill to carbon and silicon content of untreated irons and inoculated irons.*

From this diagram it can be established that irons with a high carbon : silicon ratio have a greater chilling tendency than those with a low carbon to silicon ratio, for the same carbon equivalent. For example, from Fig. 1, irons with a TC of 3.4 per cent. and silicon of 1.2 per cent. have a chill depth of $\frac{7}{32}$ in., whereas those of 3.05 per cent. carbon and 2.25 per cent. Si are chilled only $\frac{4}{32}$ in. The information is summarized in Table I.

TABLE I.—*Carbon Equivalent and Chill Depth.*

TC.	Si.	CE.	$\frac{TC.}{Si.}$	Chill.
3.4	1.2	3.8	2.84	$\frac{7}{32}$ in.
3.05	2.25	3.8	1.35	$\frac{4}{32}$ in.

Having referred to the influence of material on chill depth a return is made to high-strength processed irons to consider the present problem. As many of these irons are frequently of a high chilling tendency, namely high carbon : silicon

* Short Paper presented to the South African branch of the Institute of British Foundrymen—reported by the *Engineer and Foundryman*.

† C. O. Burgess and R. W. Bishop, "Alterations in Cast Iron Properties Accompanying Use of Strong Inoculant of the Silicon/Manganese/Zirconium Type," *Trans.* A.F.S., *52*, 671–710 (1944).

ratio, the wedge form of test is most frequently applied to control the ladle inoculation.

Therefore, in rough principle the chill test is most suited to irons in the lower ratios, as their chilling tendency is lower than those in high ratios. It is on account of the increasing section of the wedge that this method finds favour with the latter irons.

In either case, however, one may easily run into the problem of "inverse chill," namely the evidence of chill on the face opposite the chill plate in the case of chill test, or the face opposite the apex of wedge sample. In the event of this happening unexpectedly, the pig-iron supplier should not be blamed for the cause, as the remedy almost certainly lies in melting control. The condition giving rise to "inverse chilling" is established but the cause is not yet solved.

Notes from the Branches

South Africa

At the annual meeting of the South African branch of the Institute of British Foundrymen, held in Johannesburg on June 24, the retiring president, Mr. John Steele, presented the report of the year's activities. The membership now consists of 64 subscribing firms (with 26 representatives); 86 members; 82 associate members; 34 associates; and one honorary life member—a total of 267. Of the 17 resignations received, seven were in respect of members of the Cape Town sub-section which is no longer operating. Twelve applications for membership had been accepted. Lectures were well attended covering many subjects from the historical to the most modern. Five works visits had been organized.

Awards

The diploma of the Institute was awarded to Mr. John Steele for his paper on the "Thermit Process." The following branch awards were announced: The "A. H. Guy" award to Mr. H. Holdsworth; Members' Papers award to Mr. J. A. de Kiewiet; Non-members' Papers award to Dr. J. A. Petrick; Students' awards to Mr. C. T. Wasserthal (moulding); Mr. E. W. Angus (patternmaking); and Mr. C. R. Heathcote (metallurgy). The following were elected office bearers for the year 1955-1956: president, Mr. J. A. de Kiewiet; vice-presidents, Mr. G. F. Alexander and Mr. S. Pienaar. Members of the Council: Mr. N. Croft; Mr. G. Boustred; and (re-elected) Mr. K. H. Coombs; Mr. J. H. Peers; and Mr. R. C. Cross.

ORDERS for turbo-alternator sets totalling some £2,500,000 have been placed with the General Electric Company, Limited, by the Central Electricity Authority. They comprise one 120-mw and two 60-mw sets, in which the alternators will be direct-cooled by hydrogen at 30 p.s.i.g. The contract includes the supply of a condenser with a cooling surface of 70,000 sq. ft., and a six-stage feed-heating plant.

BASIC material prices rose during June to a level 1.4 per cent. above the ruling a month earlier, thus reversing the downward trend of the three previous months. During June the Board of Trade's index (June 30, 1949=100) advanced by 2.1 points to 151.0. The general price level was 4 per cent. higher than in June last. There was a rise of 14.4 per cent. in the price of raw rubber and of 4.8 per cent. in copper; zinc increased by 1.9 per cent. and home produced heavy steel scrap by 1.2 per cent.

German Pig-iron and Steel Output

Western Germany overtook the United Kingdom in steel production during the second quarter of 1955. According to the latest statistical bulletin of the United Nations Economic Commission for Europe, the UK railway strike in June was the reason for this.

Britain's steel production in the second quarter was put at an annual rate of 20,324,000 metric tons, while West Germany produced at the rate of 20,608,000 metric tons. Had it not been for the railway strike in June, British output would have been close on the 21,000,000 tons rate.

The bulletin showed that combined output of the six countries of the European Coal and Steel Community rose from a first quarter annual rate of 50,984,000 tons to a second quarter figure of 51,875,000 tons. France produced 12,800,000 tons, Belgium, 5,800,000, Italy, 5,400,000, the Saar, 3,200,000, Luxembourg, 3,100,000 and the Netherlands, 900,000. The community's total output in 1954 amounted to 43,838,000 tons.

July output of pig-iron in Western Germany is reported to have reached the record level of 1,412,000 tons. The previous peak figure was attained in March. Steel output in July, at 1,806,000 tons, was the second highest on record, being 69,000 tons below the March peak. Average daily steel output declined from 66,412 tons in June to 65,665 tons in July.

In the first seven months of the year a total of 12,190,000 tons of steel was produced, comparing with the corresponding 1954 output of 9,448,000 tons. A Düsseldorf report states that, assuming production to continue at the level of the last three months, 1955 steel output will be about 21,000,000 tons.

Residential Course on Fatigue of Metals

A week's residential course on the fatigue of metals is being held at the University of Nottingham from September 12 to 16 inclusive. The course has been organized by a joint committee of industry and the engineering departments of the University, under the chairmanship of Mr. G. Forrest (Aluminium Laboratories, Limited). It is intended that the course shall present the known facts concerning the fatigue of metals to the practising engineer, and, although no formal academic qualifications are required for enrolment, it will be assumed that those attending the course will possess either a degree or the Higher National Certificate in engineering or science. The subjects to be covered are: the fundamentals of fatigue, the fatigue properties of steels and cast iron, the fatigue properties of non-ferrous alloys, corrosion-fatigue and fretting corrosion, fatigue of aircraft, and fatigue testing. Residential accommodation for 100 people will be provided in Hugh Stewart Hall, which is situated in the University Park. All inquiries regarding the course should be addressed to the secretary, Fatigue of Metals Course, Departments of Civil and Mechanical Engineering, University of Nottingham.

METAL INDUSTRIES, LIMITED, Universal House, 60, Buckingham Palace Road, London, S.W.1, announce additions to their telephone lines and change in numbers: SLOane 5587 superseded by SLOane 7192, 7193 and 7194, SLOane 5814 and 5618 remain in service.

Badische Maschinenfabrik Centenary

Last June, Badische Maschinenfabrik A.G., Karlsruhe-Durlach, Germany, celebrated its centenary. Amongst those who participated in the celebrations were representatives of State, municipality, and various organizations, as well as friends and employees. Badische Maschinenfabrik, founded in 1855 by Mr. G. Sebold, and now one of the most important enterprises on the Continent amongst factories making foundry plant, initially became noted for the machines it produced for the match-making industry. The manufacture of foundry machines, for the firm's own requirements, began in 1872, and, later, Mr. Sebold claims to have invented the first moulding machine (Fig. 1) with mechanical ramming. It was designed as a turnover-plate moulding machine with hinged squeeze-head, the squeeze device and turnover mechanism being actuated by hand through gears. The decision to put the machine on the market led to a further extension of the manufacturing programme and soon a large number of machines and plant used in foundries was being made by the firm. In 1885 it became a joint stock company.

In 1892 the first centrifugal sand-blast machine was constructed and in 1905 the first jolt moulding machine of European design. Large jolters up to a lifting capacity of 45 tons followed after the first world war, and in 1921 the first hydraulic fettling installation with high pressure brought about a minor revolution in the field of fettling. The works was seriously damaged during the second world war, but was reconstructed soon afterwards, and in the past few years many new noteworthy designs have been placed on the market. Some completely mechanized plant has also been installed. To-day the firm employs 900 persons.

Jubilee Innovations

A new type of machine has been designed with an electro-pneumatic automatic mechanism controlling all its operations. As soon as the operator has put on and filled the moulding box, he sets the machine into operation by means of a push-button, the operations of the machine being entirely automatic from the clamping of the moulding box on to the setting down of the finished box on to the mould carriage, including the returning of the machine to the initial position. It is claimed that this automatic mechanism is already giving excellent results, as, for example, in the manufacture of baths. In the field of the sand-preparing machinery, the series of high-duty muller mixers have been extended. Other developments are taking place in connection with hydraulic fettling and shot-blast rotor machines, to include rotary-table, sprocket-table and overhead chain-conveyor systems.

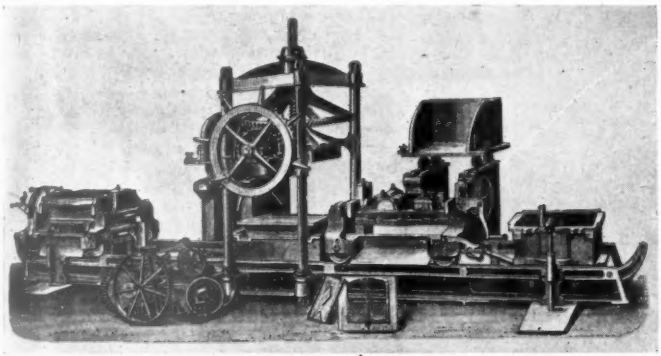


FIG. 1.—*Early moulding machine made by Badische Maschinenfabrik.*

Cutting Cast Iron

A correspondent in "Torch," the house organ of the British Oxygen Company, Limited, writes that he has read that it is advisable to have an excess of acetylene gas when cutting cast iron, and that the white plume should be from 2 to 4 in. long. While he appreciates that this information may be correct, he asks for an explanation.

The reply given is that in oxy-acetylene cutting of cast iron, the iron has to be raised to a temperature close to its melting point before the cutting action can take place effectively. This is because of the retarding effect of the graphitic carbon (contained in the cast iron) on the oxidation of the ferrite (iron) component within the composite mass of cast iron.

The excess acetylene is used in order that the desired temperature can be reached, and at the same time allow the line-of-cut to be maintained. Without the excess acetylene in the pre-heating flame, the high temperature required to initiate the oxygen-cutting action in cast iron would not be possible, at least not without completely destroying the line-of-cut and giving rise to melted and only partially cut areas of great width.

American Iron and Steel Statistics

The 83rd annual statistical report by the American Iron and Steel Institute covers fully every branch of the industry in 1954. Several new tables are included. For the first time a single table summarizes coke, blast-furnace, and steelmaking capacities by States. As a part of its general wholesale price indices, the United States Department of Labour includes an average wholesale price index of steel products, and this for the first time has been included for the years 1939 to 1954 inclusive.

Other tables not previously published show the consumption of ferro-metalloids by the steel industry, cost per hour for day-wage employees, receipts and deliveries of coke, and the production of hot-rolled products by States. Changes have been made in details of imports and exports of iron and steel products, with a view to increasing their usefulness.

The report includes also statistics of the Canadian iron and steel industry, in addition to particulars of iron-ore, pig-iron and steel output in other countries.

Company News

SIMMS MOTOR UNITS, LIMITED—The company has acquired the whole of the issued share capital of Clearex Products, a private company, manufacturing plastics products for industry. Mr. G. E. Liardet, chairman, and Mr. J. Ayres, a director and general manager, of Simms, have joined the board of Clearex.

MANLEY & REGULUS, LIMITED, makers of water fittings and hot pressings, of Wolverhampton—A final dividend of 7½ per cent., plus a cash bonus of 2½ per cent., is announced, making 15 per cent. for the year ended April 30, compared with 12½ per cent. previously. Net profits amount to £94,068, compared with £53,497.

ELLIOTT BROS. (LONDON), LIMITED—Rights for 307,384 shares were exercised in the issue of 312,000 5s. ordinary shares at 20s. each. For the 4,616 excess shares, applications were received for 230,040 shares and the excess share allotments are therefore on a much reduced scale. Applications up to five shares will be allotted in full. The allotment for applications from six to 400 shares will be five shares and over 400, 10 shares.

C.V.A. JIGS, MOULDS & TOOLS, LIMITED—The chairman, Mr. E. Aron, states, concerning automation as applied to engineering, particularly to the motor industry, that the company is "well to the forefront" in production of this type of specialized equipment. Deliveries have been effected and large orders are on hand. The tool and die business is being expanded to enable manufacture of the larger dies required for the motor industry, and another new factory, expected to be operating by the middle of 1956, is being erected.

WOLVERHAMPTON METAL COMPANY, LIMITED—Mr. T. C. James, chairman, cites in his statement the factors which contributed to the group record profit of £432,122, before tax, as compared with £372,019. New plant and improved technique for treating residues and by-products operated for the whole of the year and with developments in other departments, increasingly helped to offset the rising costs of production, etc. In some measure the increased profit was due to a realization of copper stocks held or acquired at lower price levels.

ASSOCIATED ELECTRICAL INDUSTRIES, LIMITED—The offer by the company to acquire £550,000 10 per cent. cumulative preference stock of Siemens Bros. & Company, Limited, has been accepted by holders of more than 90 per cent. of that stock. The offer, which is of two AEI 4½ per cent. "B" preference shares and 5s. in cash in exchange for each £1 unit of Siemens 10 per cent. preference, remains open to stockholders who have not accepted. Allotment letters for the AEI 4½ per cent. "B" preference shares in respect of acceptances received by August 5 were posted on August 12.

E. J. & J. PEARSON, LIMITED, firebrick and refractory manufacturers, of Stourbridge (Worcs)—Stating that the order-book position is satisfactory, Mr. G. V. Evers, chairman, says equally good results should be maintained in the future as for the year to March 31 last. For that period, group trading profits were £11d 020 (£119.215). The total ordinary dividend is again 18 per cent. Recent advances in furnace technology have necessitated a general review of refractory usage and manufacture, and, in addition, the full effect of atomic industrial power has yet to be assessed, he says.

ASSOCIATED BRITISH ENGINEERING, LIMITED—The combined turnover of manufacturing subsidiaries in the year ended March 31 last despite more competitive trading conditions, showed a marked increase in both home sales and exports, states Mr. L. W. Robson, chairman. Group trading profits, including three months' figures for British Polar Engines, Limited, acquired during the year, totalled £305,524 after depreciation but before tax, comparing with £205,221. Investment and other income fell by £39,196 to £23,771 consequent upon the sale at the end of last year of the holding in the Brush Group, Limited.

HEENAN & FROUDE, LIMITED—On August 29 an extraordinary general meeting of the company will be held at Worcester to change the name of the company to Heenan Group, Limited. It is intended that Heenan Group, Limited, will be the holding company, while Heenan & Froude, Limited, will be re-registered as a subsidiary entirely devoted to manufacturing activities. Other companies in the group are:—Fielding & Platt, Limited, hydraulic engineers, of Gloucester; W. G. Bagnall, Limited, locomotive builders, of Stafford; Morton Machine Company, Limited, mixing machinery manufacturers, of Glasgow; Industrial Waste Eliminators, Limited, abattoir equipment manufacturers, of London.

WESTINGHOUSE BRAKE & SIGNAL COMPANY, LIMITED—A resolution to increase the authorized capital of the company from £2,500,000 to £3,500,000 accompanies proposals for increased borrowing powers. The capital creation will give the company 1,449,205 £1 unissued shares which the directors consider desirable to have available for use in any funding operation which may become necessary, or to acquire suitable productive capacity if opportunity arises for the purchase of a going concern by exchange of shares. In justification for the increase in borrowing powers, the directors point to rapidly increasing orders for the whole range of the company's products, in particular brakes and signalling for railways at home and abroad, colliery and mining equipment, steam heating apparatus, copper oxide, selenium, and germanium rectifiers and rectification equipment, and air pressure brakes for automotive equipment.

Increases in Capital

INCA STEEL COMPANY, LIMITED, Sheffield, increased by £5,000, in £1 ordinary shares, beyond the registered capital of £10,000.

POWER TOOLS (BIRMINGHAM), LIMITED, increased by £9,000, in £1 ordinary shares, beyond the registered capital of £3,000.

SHEETCRAFT & OVENS, LIMITED, London, E.C.4, increased by £8,000, in £1 ordinary shares, beyond the registered capital of £2,000.

SPRINGS & PRESSINGS (DARLASTON), LIMITED, increased by £10,500, in £1 ordinary shares, beyond the registered capital of £2,000.

UNITED SPRING COMPANY, LIMITED, Smethwick, increased by £30,000, in £1 ordinary shares, beyond the registered capital of £30,000.

BEARINGS (NORTH-WESTERN), LIMITED, Liverpool, increased by £45,000, in £1 ordinary shares, beyond the registered capital of £5,000.

COVENTRY GAUGE & TOOL COMPANY, LIMITED, increased by £500,000, in 10s. shares, beyond the registered capital of £1,000,000.

DORMAN LONG (CHEMICALS), LIMITED, Middlesbrough, increased by £50,000, in £1 ordinary shares, beyond the registered capital of £950,000.

THOS. FIRTH & JOHN BROWN, LIMITED, Sheffield, increased by £4,450,000, in £1 ordinary shares, beyond the registered capital of £2,550,000.

CROWN FOUNDRY COMPANY, LIMITED, Far Cotton, Northampton, increased by £15,000, in £1 ordinary shares, beyond the registered capital of £5,000.

R. B. HILTON, LIMITED, engineers, etc., of London, S.E.3, increased by £55,000, in £1 ordinary shares beyond the registered capital of £5,000.

CLYDE BLOWERS, LIMITED, marine engineers, etc., of Clydebank, increased by £30,000, in £1 ordinary shares beyond the registered capital of £20,000.

JOHN SIMPSON JR. (GLASGOW), LIMITED, steel merchants, etc., increased by £10,000 in £1 ordinary shares, beyond the registered capital of £15,000.

News in Brief

STEEL GRIT OF CANADA (1955), LIMITED, have erected a new plant at 170, Beverley Street, Galt, Ontario.

THE telephone number of the accounts and sales departments of Sunvic Controls, Limited, is now Harlow 25271.

THE NAME of the Institution of Sanitary Engineers has been changed to the Institution of Public Health Engineers.

PLANS have been approved for extending the optical works of C. A. Parsons & Company, Limited, marine engineers, etc., of Newcastle-upon-Tyne.

JAMES LAMONT & COMPANY, LIMITED, Port Glasgow, have secured an order for a cargo motorship with a carrying capacity of 1,550 tons for British owners.

THE TELEPHONE NUMBER of the London branch sales office of British Insulated Callender's Cables, Limited, at 10-14, White Lion Street, N.1, is now TERminus 2701.

WICKMAN, LIMITED, Banner Lane, Tile Hill, Coventry, announce that they have been appointed sole agents for the products of Arthur Scrivener, Limited, Tyburn Road, Birmingham.

BRENT FOUNDRY, Studley Grange Road, London, W.7, has successfully appealed to the Ministry of Housing and Local Government against the refusal of the local authority to allow extensions to be built.

MANOR ENGINEERING COMPANY, LIMITED, Manor Foundry, Fenton, Stoke-on-Trent, are seeking permission to erect a new foundry and works premises on part of the site of Borough Pottery, Stoke-on-Trent.

INTERNATIONAL REFINING COMPANY, LIMITED, of Roding Mill Works, Woodford Bridge, Essex, have opened a Glasgow office at 400, Great Western Road. The Scottish manager is Mr. W. S. McGregor.

ATLAS DIESEL COMPANY, LIMITED, Wembley, Middlesex, compressed air engineers, announce that the new address of their Bristol branch is 47a, Zetland Road, Bristol, 6 (Bristol 45036/7). Branch manager is Mr. W. J. Clarke.

THE BLUE FUNNEL passenger and cargo liner Dolius, launched on August 4 by Harland & Wolff, Limited, is the first Belfast-built ship to be powered by the new Harland-B. & W. pressure-charged two-stroke Diesel engine.

B.I.S.C. (ORE), LIMITED, announces that 200,000 tons of iron ore were loaded recently at Seven Islands in a period of 48 hours. Commencing on Friday afternoon, 14 ships were loaded, and the maximum loading rate was 10,000 tons per hour.

THE DARTS CLUB of Alfred Ellison, Limited, iron-founders, of West Bromwich, have again had a successful year, winning the local league and no fewer than five cups. To mark their successes tankards have been presented to each player by the directors.

SEVENTEEN PEOPLE, representing a total of 747 years' past service with the Brush Electrical Engineering Company, Limited, Loughborough, have received supplementary long-service awards. Fifteen were present personally, with the widows of two other former employees.

A REPEAT ORDER for six 300-h.p. Diesel-electric shunting locomotives has been received by Brush Bagnall Traction, Limited, Loughborough, from the Steel Company of Wales, Limited. This is in addition to an earlier order for seven similar locomotives which has now been completed.

C. V. A. JIGS, MOULDS & TOOLS, LIMITED, Portland Road, Hove, Sussex, are having new works premises covering an area of 240,000 sq. ft. erected at Leneside Industrial Estate, Wickbourne, Littlehampton, Sussex. First part of the premises to be built will be a foundry covering an area of 45,000 sq. ft.

THE British Motor Corporation, Longbridge, Birmingham, have formed a subsidiary company entitled B.M.C. Service, Limited, with the object of co-ordinating all service operations within the group and bringing them under central control. A new central parts depot has been built at Cowley, Oxford.

SCOTT & SONS, Bowling, are to build a small motorship for Scottish Malt Distillers, Limited, for whom they built the 96-ton Pibroch in 1923. The new vessel will be similar to the 153-ton Glenshire—a diesel-engined version of a Clyde "puffer" which was completed by the Bowling firm two years ago.

AGAINST COMPETITION from Continental and Australian companies, Horseley Bridge & Thomas Piggott, Limited, of Tipton, made a successful tender for a river bridge for the Department of Main Roads in New South Wales, Australia. The bridge, 716 ft. long by 40 ft. wide, is to span the Karuah River.

A SALVAGE TEAM of the Wolverhampton Metal Company, Limited, Wednesfield, is to dismantle what remains of the battleship Warspite, wrecked off the Cornish coast eight years ago. The firm acquired the hulk (in Prussia Cove, near Penzance) in 1949 and a salvage team has already recovered thousands of tons of steel and non-ferrous metals.

THE US Office of Defence Mobilization has announced the release of 1,000,000 lb. of nickel for use by US industry to meet shortages. The metal was originally intended to be delivered to the Government stockpile. A total of 12,000,000 lb. of nickel has now been diverted from delivery to the stockpile to industry since February of this year.

THE "SILICONES FOR INDUSTRY" exhibition is to be held in Leeds in Large Hall, Leeds Church Institute, 5, Albion Place, from September 26 to 30. The exhibition will be open each day from 10 a.m. until 6 p.m., with the exception of Monday (opens 2.30 p.m.). There are many working exhibits. Film shows will be given at intervals throughout each day.

A TWO-YEAR RESEARCH PROGRAMME costing £10,000 is to be started at the Wolverhampton and Staffordshire Technical College in the autumn. The project concerns the development of a gas turbine, designed to burn peat. The work is being financed by the Ministry of Fuel and Power and is to be done by two newly-appointed research Fellows, Mr. J. C. Wright and Mr. J. Thompson.

SHORTAGE OF SKILLED MOULDERS is retarding the firm's ability to develop certain sections of its foundries, Mr. H. Richard Bettison, chairman of the Hill Top Foundry Company, Limited, told shareholders at the annual general meeting in Birmingham on August 9. He added that, in spite of labour difficulties, the company's turnover was 20 per cent. up on that of the previous year.

PRODUCTION of the Ford Popular car has begun at the Doncaster works of Briggs Motor Bodies, Limited, a subsidiary of the Ford Motor Company, Limited. An assembly line, three quarters of a mile long, and other machinery, has been installed at a cost of £180,000. Production was expected to reach full volume by the end of last week, after which it was hoped that 120 cars would be turned out daily.

News in Brief

THE Loewy Engineering Company, Limited, Bournemouth, have secured an order from the steelworks of Ilva for a continuous medium strip mill worth more than £500,000, to be delivered at the end of 1956. The plant is similar, but somewhat smaller in size, to the continuous strip mill which the company is building for the Steel, Peech & Tozer branch of the United Steel Companies, Limited.

REPRESENTATIVES of the National Association of Non-Ferrous Scrap Metal Merchants, the National Federation of Scrap Iron, Steel and Metal Merchants, and the Waste Trade Federation will sit on the Joint Non-Ferrous Scrap Committee, a joint organization representing various trade associations concerned with collecting and selling non-ferrous scrap, which has been formed with London headquarters at 21, Devonshire Street.

THE UNIVERSITY OF NOTTINGHAM is organizing a week's residential course covering the fatigue of metals, to be held in the Hugh Stewart Hall, from September 12 to 16. The fee for the course is 10 guineas and for the accommodation seven guineas. The lecturer on the "Fatigue Properties of Cast Iron" is to be Mr. H. Morrogh of the British Cast Iron Research Association. Dr. J. W. Cuthbertson is to cover the subject of non-ferrous metals.

BRITISH INSTITUTE OF MANAGEMENT announces that its National Conference, the 10th to be held since its inauguration, will this year be held at Harrogate from November 2 to 4. Speakers who have already accepted invitations to address the conference include John Diebold, American pioneer of the application of "automation," Sir Geoffrey Vickers, V.C., and Sir Charles Goodeve, O.B.E., F.R.S., director of the British Iron and Steel Research Association.

DUNLOP RUBBER COMPANY, LIMITED, announce that rubber bodies for wheelbarrows, up to now supplied only to manufacturers, are to be put on general sale. They are of Fortiflex, a rubber resin compound, and are in two sizes, 3 and 4 cub. ft. Among improvements in design made since these rubber bodies were introduced two years ago are the reinforcement of the two front corners and a clean lip-over finish to the supporting skeleton steel frame, so eliminating the rivet fastening arrangement.

A FOUR-MAN COMMITTEE of workers has been set up at the firm of Elkington & Company, Limited, Birmingham, to act as a link between the management and local residents. The committee was formed after a series of complaints from householders in the area about fumes emitted from the company's foundry. The firm has already spent £80,000 on reducing atmospheric pollution. Members of the new committee are to pinpoint the source of the trouble and then report it to the management.

THE FIRST CONFERENCE of the Federation of British Industries, will be held in Birmingham. The main theme will be overseas publicity. The F.B.I. believes that British firms are not sufficiently aware of the need to publicise themselves and this country's export products in overseas markets, and the forthcoming conference—at the Botanical Gardens, Edgbaston, on November 1, is the start of a campaign to convince member firms of the need for overseas publicity, and to indicate the ways to achieve it.

THE JULY ISSUE of "Berkshire Life" contains a contribution by Alan C. Sandall on the Pulsometer Engineering Company, Limited, which is celebrating its eightieth birthday. Manufacture of the new type of steam pump which gave the company its name was begun at Battersea, in London, in 1875, by John Eliot Hodgkin, with 30 employees. In three years the success of the venture made necessary a move to Nine Elms—later to become the name of the works at Reading to which the company moved 45 years ago.

THE AUTUMN MEETING of the Institute of Welding will be held in London from November 2 to 4, 1955, and will comprise the annual dinner and presidential address, followed by four technical sessions devoted to the presentation and discussion of papers on various aspects of the inert-gas arc-welding processes. The principal guest at the dinner will be Mr. F. J. Errol, M.P., Parliamentary Secretary to the Ministry of Supply, and Sir Edward Boyle, Economic Secretary to the Treasury, has also accepted an invitation to attend.

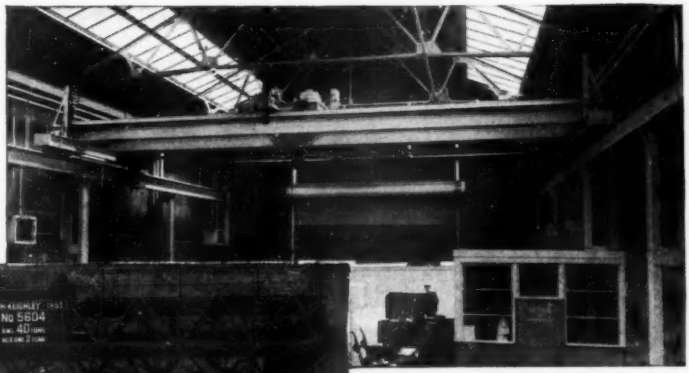
DISCUSSIONS are taking place between Walsall Town Council and Tube Investments, Limited, about a site at Walsall where scientists can investigate the application of nuclear energy for industrial purposes. The project is believed to involve the sum of some £500,000. The site for the proposed research station, which would occupy about six acres, is at the former Walsall airport. It is understood that about 200 scientists would be engaged on the project. The question of purchase of the land is not involved, as Tube Investments, Limited, have for some time held a lease of the property.

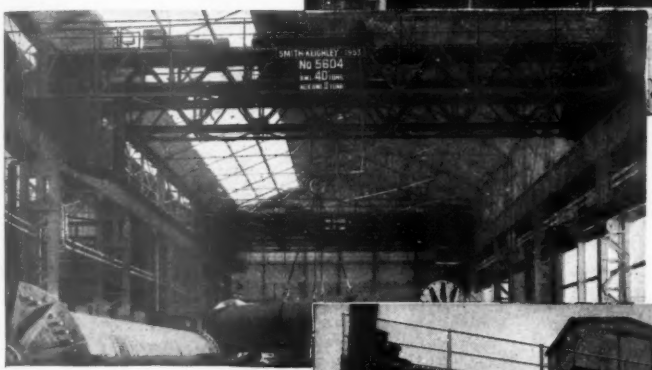
AT THE ANNUAL GENERAL MEETING of the Wolverhampton Metal Company, Limited, Mr. Thomas C. James, chairman, predicted "a measure of prosperity for some time to come." He added that the biggest problem at present is the high price of copper, which, he forecast, must sooner or later return to a lower and steadier level. Mr. James told shareholders that a complete new physical testing unit has been installed at the factory, and that the company is now able to issue certificates which cover both physical and chemical properties and which are accepted by Government service departments and other authorities.

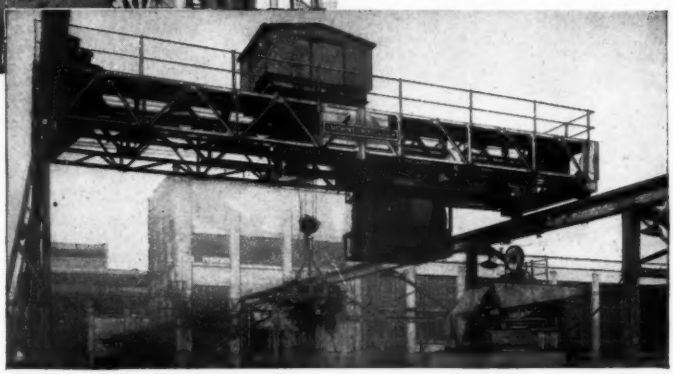
BRITISH WELDING RESEARCH ASSOCIATION is arranging a number of meetings on increasing productivity by the use of welding to be held at various centres throughout Great Britain. The first meeting is in Glasgow on September 20 and 21, at the Institution of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, Glasgow, C.2. This meeting will be opened at 9.30 a.m. on the first day by the Rt. Hon. Lord Provost of Glasgow, Mr. Andrew Hood. Opening addresses will be given by Mr. F. E. Rogers, chief of the productivity and technical co-operation division of the United States Operations Mission to the United Kingdom, and by a representative of the British Productivity Council.

THE AUTUMN CONFERENCE of the British Occupational Hygiene Society will be held at the London School of Hygiene and Tropical Medicine (by kind permission of the Dean) at 11 a.m. on November 4. The morning and afternoon sessions will be introduced by the Chief Inspectors of Factories and Mines, respectively, and papers have been arranged to cover the following subjects: Protection of the Lungs; Protection of the Skin; Protection of the Eyes; and Protection of the Feet. Further particulars can be obtained from the hon. scientific secretary of the Society, Mr. D. Turner, M.R.C. Laboratories, Holly Hill, Hampstead, London, N.W.3.

IF IT'S A LIFTING JOB







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Personal

Mr. WILLIAM HOLYOAK has been appointed production manager of the Dunlop Rubber Company, Limited, Birmingham.

Mr. T. J. MCARTHUR has been appointed a director of Stewart & Gray, Limited, vitreous enamel manufacturers, of London, S.W.17.

Mr. C. M. SPIELMAN has been appointed chairman of Whessoe, Limited, in succession to Mr. H. G. JUDD, who has retired after holding office for 35 years. Mr. Judd remains on the board.

Mr. BRIAN DAVIDSON has been appointed by the chairman of the Monopolies and Restrictive Practices Commission to take the place of Mr. C. E. WRANGHAM on the group recently appointed to deal with the metal windows inquiry.

Mr. J. G. WISTREICH, who was recently appointed deputy head of the mechanical working division of the British Iron and Steel Research Association, is continuing to carry out his former duties as head of the Association's metalworking laboratories at Sheffield.

The Earl of BALFOUR, managing director of Bruntons (Musselburgh), Limited, steel rollers, wire rope manufacturers, etc., has been chosen to represent the employers on a working party appointed by the Scottish Council (Development and Industry) to investigate the economic conditions and prospects of Midlothian.

Newton Chambers & Company, Limited, Thorncliffe, near Sheffield, announce the appointment of Mr. C. R. LUND as chemicals export manager. Mr. Lund has been assistant chemicals consumer sales manager at Thorncliffe since 1941, having previously been on the technical sales staff of the Michelin Tyre Company, Limited.

SEVENTY-YEAR-OLD Mr. JOHN BROWN MOCHRIE, of Falkirk, who worked in the boxmaking and packaging department of Smith & Wellstood's Bonnybridge Foundry, retired recently after 50 years' unbroken service, except for 3½ years during the first world war when he was on active service. He was presented with a monetary gift from his colleagues.

After 36 years with the United Steel Companies, Limited, Mr. CHARLES BOULSTRIDGE BAILEY has retired from the position of general manager of the ore-mining division of the group. The fourth generation of a family of mining engineers, Mr. Bailey first joined the company at Colsterworth, where he began the development of an open-cast mine using hand methods.

The Ministry of Supply announces that Dr. E. A. PERREN has been appointed chief superintendent of the Chemical Defence Experimental Establishment at Porton, with effect from September 1, in succession to Mr. S. A. MUMFORD. Dr. Perren, who is 55, has been superintendent of research of the CDEE since 1951. Before that he was, for two years, chief superintendent of the Canadian Research and Development Establishment, Suffield, Alberta.

BEFORE THE CLOSE of the works of Shanks & Company, Limited, Tubal Works, Barrhead, Renfrewshire, for the summer vacation, presentations were made to employees who had reached retirement age. Amongst those who had received gifts was Mr. ARCHIBALD ALLISON, brass finishing department, who has 57 years' service to his credit. The Allison family has served the firm for almost 240 years. William, who was foreman in the department, retired recently after 50 years' service. Their father served 50 years, James 46 years, and Margaret 36 years.

Sir PERCY MILLS, BT., K.B.E., chairman of the National Research Development Corporation, has asked the President of the Board of Trade to allow him to relinquish this appointment for business reasons. The President has accepted with regret Sir Percy's resignation and has appointed Sir ALAN A. SAUNDERS, O.B.E., to succeed him as chairman. The chairmanship of the Corporation is a part-time appointment. Sir Percy Mills has served as chairman since the establishment of the Corporation in June, 1949. During that period the Corporation has acquired a large portfolio of patents and has introduced several hundred inventions into British industry. Sir Alan Saunders had been a member of the Corporation since June, 1954. His appointment as chairman is for four years.

Bilateral partnership policy concerning migration, industrial development, and finance for industrial development will be discussed in Australia by Sir Clifford Heathcote-Smith, vice-chairman of the Migration Council, who flew to Australia on August 11. Sir Clifford will be joined shortly by Sir GEORGE BINNEY, a director of the United Steel Companies, Limited, who is going to Australia primarily on business. Sir George is also a director of Vulcan Foundry, Limited, and of a number of other companies.

Mr. A. G. ELLIOTT, production controller of Sheepbridge Equipment, Limited, has been appointed works engineer of the Chesterfield works of the Sheepbridge Engineering group and has been succeeded by his deputy, Mr. A. WELLS. Mr. G. A. MEIKLE has been appointed apprentice training officer at the Chesterfield works. Mr. E. DENNIS has been appointed sales manager of Automotive Engineering, Limited, Twickenham (Middx), and Light Production, Limited, Slough (Bucks). He was previously technical sales representative, with special reference to pistons for the motor industry. Formerly southern area representative for Automotive Engineering, Mr. E. A. MACDONELL has been appointed sales manager of Clews Petersen, Limited, West Hampstead, London, N.W.6.

Obituary

Mr. FREDERICK GASTON PENNY, managing director of International Combustion (Holdings), Limited, and chairman, Aberdare Cables (Holdings), Limited, has died. A memorial service took place at Brailsford Parish Church, Derby, on August 10.

Lord RAMSDEN OF BIRKENSHAW died at his home, at Gomersal, near Leeds, on August 9, at the age of 72. He was chairman of A. & S. Henry & Company, Limited, Crosthwaite Furnaces & Scriven Machine Tools, Limited, and the Monotype Corporation, Limited, and a director of G. Beaton & Sons, Limited, British Insulated Callenders' Cables, Limited, and Lloyds Bank, Limited. He was a former chairman of Ronald Johnson, Clapham & Morris, Limited, and a former director of the Birmingham Small Arms Company, Limited. Eugene Ramsden was knighted in 1933, created a baronet in 1938, and elevated to the peerage in 1945. He was formerly Conservative M.P. for Bradford North for more than 20 years.

Miss JULIA LLOYD, the seventh of the 12 children of the late Mr. Samuel Lloyd, of Sparkbrook, Birmingham, founder of the firm of Stewarts and Lloyds, Limited, bequeathed to Birmingham University a legacy of several thousand pounds to establish a readership in social philosophy. Miss Lloyd died last April at the age of 87.

The Barber of Seville

HE IS AN ARTIST; and, as artists should, he chooses his instruments most carefully. He chooses British-made razors.

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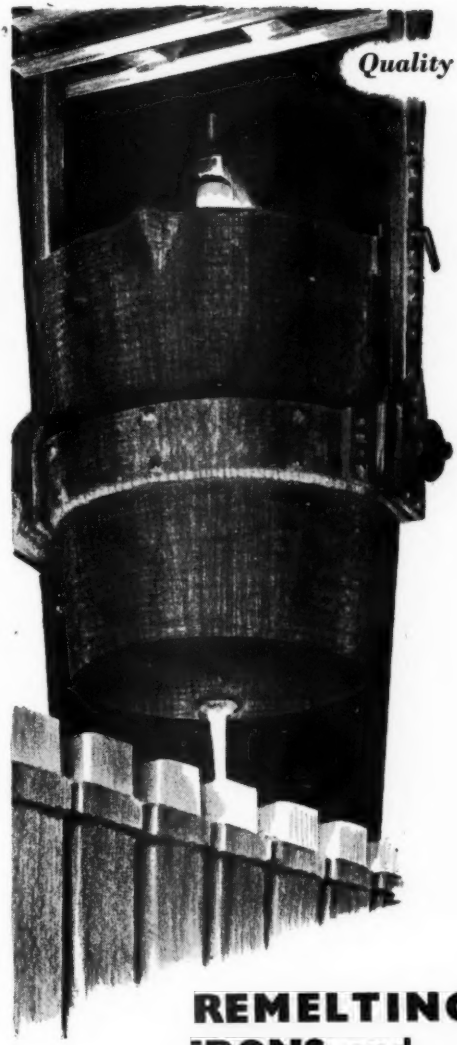

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LMAS/PPP/SSHP

Raw Material Markets

Iron and Steel

Outputs of pig-iron from the furnaces in blast are on a good scale and for all grades there is a continued heavy demand. Producers of certain grades of pig-iron are anxious to improve their iron-ore stocks, which were seriously depleted by the rail and dock strikes and have also been affected by reduced consignments due to the scarcity of ships. Deliveries of blast-furnace coke are fairly good, but larger stocks at the furnaces would be welcomed.

The light foundries keep reasonably well occupied, although they are feeling the effects in some sections of the hire-purchase restrictions on such articles as domestic utensils. The supply of high-phosphorus pig-iron to these foundries and also to the jobbing foundries, most of which are well employed, about balances the demand, but there is little or no margin either at the foundries or at the furnaces.

The pressing need at present is for additional supplies of hematite and low- and medium-phosphorus irons. The speciality, motor, and heavy engineering foundries cannot obtain what they require in the way of pig-iron; their stocks are low and most of them are working from hand to mouth.

Some improvement in the supply of hematite has resulted from increased production on the West Coast, but there is a considerable gap to be filled and certain consumers are seeking supplies from the Continent, although with little success. There appears to be no immediate chance of improvement in the supply of the low- and medium-phosphorus irons.

With the shortage of pig-iron there are increased demands for scrap, and the heavier and better grades of machinery and cast-iron scrap are in short supply.

Deliveries of steel semis from home steelworks continue on a subdued scale, and the re-rollers are hoping for an increased flow of imported material. Increased prices for small bars, light sections, etc., have not affected the demands from home consumers. In the case of export, most orders have been confirmed at the new levels; in fact, were the material available, much more export business could be obtained. Demand for heavy finished products is maintained at a high level.

Non-ferrous Metals

Friday's announcement by a spokesman of the Kennecott Copper Corporation indicating that the company and the trade unions in Utah had reached a wage contract settlement has eased the United States copper outlook. Unfortunately, at the same time reports from the Rhodesian Copperbelt revealed that all European underground miners had stopped work at the Mufulira mine last Thursday, but there was a resumption on Saturday.

In London last week copper values fluctuated within fairly close limits, cash closing £2 up and three months 10s. better. News from Chile reveals that the Kennecott and Anaconda companies have agreed to sell about two thirds of their copper in Europe and the balance in the US. No releases have been made from the stockpile, but diversions are likely to be moderately heavy in the third quarter.

In the UK and on the Continent demand for copper is not good, but there are some signs of awakening interest as factories get into their stride after the holiday season. Production of copper seems to be moving up in spite of recurrent strikes, and it is reported that Chile's output this year is likely to reach 420,000 tons, against 320,000 tons last year.

The other metals in London all showed an easier tendency. Lead lost £1 5s., both positions, although favourable conditions were reported from the United States, where buyers were active. Zinc stocks in America showed an increase at July 31—reversing the recent trend. On the London market, first half August dropped by £1 and first half November by 15s. The market was active. In tin, cash fell by £7 and three months by £5 10s. Trading on the market was rather slow.

Official metal prices were as follow:—

COPPER, Standard—*Cash:* August 11, £357 10s. to £358 10s.; August 12, £357 to £358; August 15, £358 10s. to £359 10s.; August 16, £361 to £362; August 17, £371 to £373.

Three Months: August 11, £351 to £352; August 12, £351 to £351 10s.; August 15, £351 10s. to £352; August 16, £351 10s. to £352; August 17, £356 to £357.

TIN, Standard—*Cash:* August 11, £747 10s. to £748 10s.; August 12, £750 to £751; August 15, £750 to £751; August 16, £752 to £753; August 17, £754 10s. to £757.

Three Months: August 11, £742 10s. to £743; August 12, £745 10s. to £746; August 15, £745 10s. to £746; August 16, £747 10s. to £748; August 17, £751 to £752.

LEAD—*First half August:* August 11, £104 15s. to £105; August 12, £104 15s. to £105; August 15, £104 15s. to £105 5s. *Second half August:* August 16, £105 to £105 5s.; August 17, £105 15s. to £106.

First half November: August 11, £104 10s. to £104 15s.; August 12, £104 5s. to £104 10s.; August 15, £104 10s. to £104 15s. *Second half November:* August 16, £104 10s. to £104 15s.; August 17, £105 5s. to £105 10s.

ZINC—*First half August:* August 11, £88 10s. to £89; August 12, £88 15s. to £89; August 15, £88 15s. to £89 5s. *Second half August:* August 16, £89 to £89 5s.; August 17, £89 5s. to £89 10s.

First half November: August 11, £88 15s. to £89; August 12, £89 to £89 5s.; August 15, £89 to £89 5s. *Second half November:* August 16, £89 to £89 5s.; August 17, £89 5s. to £89 10s.

Appleby-Frodingham's Record

A RECORD PIG-IRON PRODUCTION of 100,186 tons is announced by the Appleby-Frodingham Steel Company (branch of the United Steel Companies, Limited), Sheffield, during the four weeks ended August 6.

It is the first time that the 100,000-ton mark has been achieved at Appleby-Frodingham, the previous highest being just over 87,000 tons. The record output was achieved with lean home ores dug locally.

Contracts Open

The date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

ULSTER, August 19—Iron castings, aluminium sheet, and aluminium sections, for the 12 months commencing October 1, 1955, for the Transport Authority. The Stores Superintendent, Duncrue Street, Belfast.

ULSTER, August 19—Grinding wheels, segments, etc.; pistons, cylinder liners and piston rings; high-speed steel twist drills, taps and dies, tap wrenches, die stocks, and solid hexagon die nuts; wood screws; high-tensile bolts, nuts, and set screws; machine screws and nuts; batteries and battery plates; brass and steel hinges; hacksaw blades and bandsaw blading; fire extinguishers and refills; electric accessories and other equipment, for the 12 months commencing October 1, 1955, for the Transport Authority. The Stores Superintendent, Duncrue Street, Belfast.

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

August 17, 1955

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £17 1s. 0d.; Birmingham, £16 13s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £18 12s. 9d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £19 8s. 3d.

Scotch Iron.—No. 3 foundry, £19 5s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £21 3s. 0d.; South Zone, £21 5s. 0d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £22 0s. 0d.; South Zone, £22 3s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. of England (local iron), £19 5s.; Scotland (Scotch iron), £19 11s. 6d.; Sheffield, £20 12s. 0d.; Birmingham, £20 19s. 6d.; Wales (Welsh iron), £19 11s. 6d.

Basic Pig-iron.—£16 16s. 6d. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £40 15s. 0d., scale 15s. per unit; 75 per cent. Si, £63 0s. 0d., scale 16s. per unit.

Ferro-vanadium.—50/60 per cent., 23s. 8d. to 25s. 0d. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 11s. 0d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £230 0s. 0d.; 38/40 per cent., £279 0s. 0d.

Ferro-tungsten.—80/85 per cent., 17s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 20s. 6d. per lb. of W.

Ferro-chrome (6-10 ton lots).—4/6 per cent. C, £83 0s. 0d. to £86 0s. 0d., basis 60 per cent. Cr, scale 25s. 0d. per unit; over 6 per cent. C, £91 0s. 0d. to £84 0s. 0d., basis 60 per cent. Cr, scale 24s. 0d. per unit; 2 per cent. C,* 1s. 11½d. per lb. Cr; 1 per cent. C,* 2s. 0d. per lb. Cr; 0.15 per cent. C,* 1s. 11d. to 2s. 1d. per lb. Cr; 0.10 per cent. C,* 1s. 11d. to 2s. 2d. per lb. Cr; 0.06 per cent. C,* 2s. 3d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 7s. 0d. to 7s. 6d. per lb.

Metallic Manganese.—93/95 per cent., carbon-free, £249 0s. 0d.; 96/98 per cent., £269 0s. 0d.

Ferro-columbium.—60/75 per cent., Nb + Ta, 37s. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £53 17s. 6d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £26 19s. 0d.; tested, 0.08 to 0.25 per cent. C, £27 19s. 0d.; hard (0.41 to 0.60 per cent. C), £29 5s. 6d.; silico-manganese, £36 7s. 6d.; free-cutting, £31 0s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £34 12s. 0d.; silico-manganese, £36 7s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £31 11s. 0d.; basic, hard, over 0.41 up to 0.60 per cent., C, £32 13s. 6d.; acid, up to 0.25 per cent. C, £35 12s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £33 1s. 6d.; boiler plates (N.-E. Coast), £35 11s. 6d.; floor plates (N.-E. Coast), £34 10s. 6d.; sectional material, N.-E. Coast, £30 19s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £33 19s. 6d.; flats, 5 in. wide and under, £33 19s. 6d.; hoop and strip, £35 1s. 6d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £36 5s. 0d.; black sheets (hand mill), 17/20 g., £46 13s. 6d.; galvanized corrugated sheets, 24 g., £54 14s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £58 0s. 3d.; nickel-chrome, £81 10s. 0d.; nickel-chrome-molybdenum, £92 7s. 6d.

NON-FERROUS METALS

Copper.—Cash, £371 0s. 0d. to £373 0s. 0d.; three months, £356 0s. 0d. to £357 0s. 0d.; settlement, £373 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 3s. 5½d. per lb.; rods, 399s. 9d. per cwt. basis; 20 s.w.g., 433s. 0d. per cwt.

Tin.—Cash, £754 10s. 0d. to £757 0s. 0d.; three months, £751 0s. 0d. to £752 0s. 0d.; settlement, £757 0s. 0d.

Lead (Refined Pig).—First half August, £105 15s. 0d. to £106 0s. 0d.; first half November, £105 5s. 0d. to £105 10s. 0d.

Zinc.—First half August, £89 5s. 0d. to £89 10s. 0d.; first half November, £89 5s. 0d. to £89 10s. 0d.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £120 10s. 0d.; rolled zinc (boiler plates), all English destinations, £118 5s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £103 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 8⅞d. per lb.; rods, drawn, 3s. 6¼d.; sheets to 10 w.g., 349s. 6d. per cwt.; wire, 3s. 4¼d.; rolled metal, 349s. 6d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £219; B6 (85/15), —; BS249, —

Brass (High Tensile).—BS1400, HTB1 (30 tons), £276; HTB2 (38 tons),—; HTB3 (48 tons),—.

Gunmetal.—RCH, 3/4 per cent. tin, —; BS1400, LG2 (85/5/5/5), £306; LG3 (86/7/5/2), £317; G1 (88/10/2/½), £386; (88/10/2/1), £377.

Phosphor Bronze.—BS1400, PB1 (AID released), £408 per ton.

Phosphor Bronze Strip, etc.—Strip, 490s. 3d. per cwt.; sheets to 10 w.g., 513s. 9d. per cwt.; wire, 4s. 11⅞d. per lb.; rods, 4s. 4d.; tubes, 4s. 2½d.; chill cast bars: solids 4s. 4d. cored 4s. 5d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 4s. 3d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 7½d.; special quality turning rod, 10 per cent.; ½ in. dia., in straight lengths, 4s. 6½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 4d. per lb. Antimony, English, 99 per cent., £210 0s. 0d. Quicksilver, ex-warehouse, £94 0s. 0d. to £95 0s. 0d. Nickel, £519 0s. 0d. Aluminium, ingots, £171 0s. 0d.; aluminium bronze (BS1400), AB1, £348; AB2, £360. Solder, brazing, BS1845, 2s. 11d. lb.; granulated, 3s. 3d. lb.

* Average 68-70 per cent.

New Patents

(Copies of complete specifications are obtainable from the Patent Office Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3/-.)

733,913. E. B. Ruscoe, Redditch Worcs. and J. J. Turner, King's Norton, Birmingham.

A continuous metal casting machine in which the power operated mechanism for raising and lowering the table makes the table rise at a higher speed than that at which it is lowered. The invention refers to those machines where molten metal is poured through a cooling ring on to a table which is capable of being raised or lowered.

733,981. Fairchild Engine and Airplane Corporation, Farmingdale, Long Island, New York, USA.

This patent refers to the casting of a bi-metallic article, which consists of a metal casing having a thin sheet of different metal permanently united to it. The sheet is mounted in a mould which is shaped for the sheet on the finished casting. The mould is sealed and molten casting metal is injected at sufficient pressure to force the sheet into contact with the mould shape. The surface of the sheet has approximately the same temperature as the casting metal so as to alloy with it. The resulting bi-metallic casting can then be removed from the mould.

734,064. M. A. Bunford, Monte Carlo, Monaco.

An apparatus for the centrifugal casting of metals. It consists of a container for molten metal, a mould unit having a cavity for casting, the cavity being vented to atmosphere, and a means for rotating the mould unit. Also fitted is a control for causing the flow of molten metal through a passage in the mould cavity while producing a reduced pressure within the cavity.

734,122. Polygram Casting Company, Limited, Power Road, Gunnersbury, London, W.4.

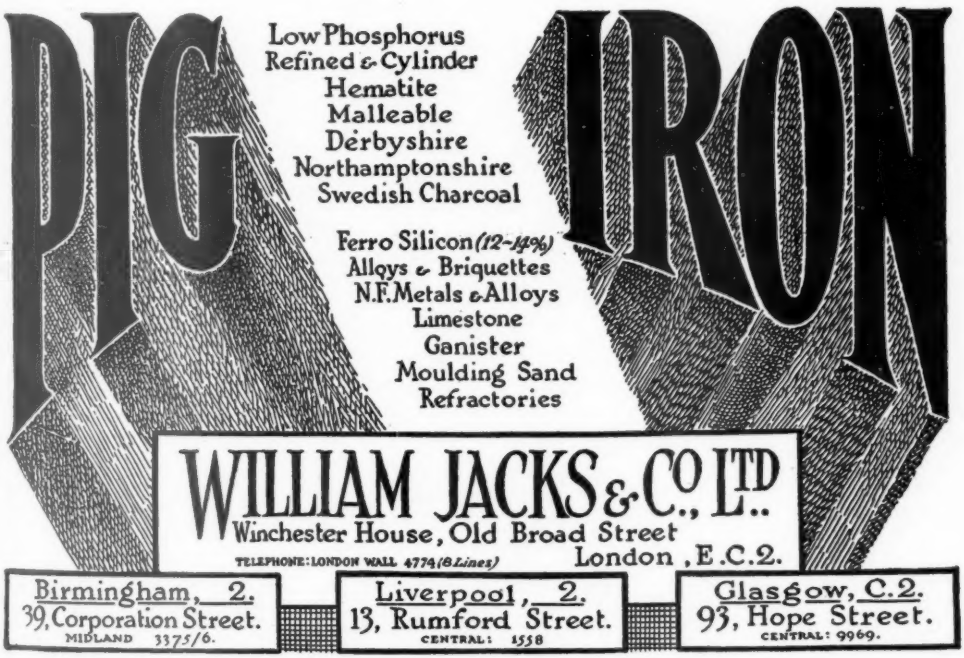
Patternplates for use in mould making (also for half moulds) from a moulding mixture such as sand and a thermosetting resin incorporating a hardening agent. The mixture is poured over the heated pattern which is fitted with a thin rim extending all round its edges and projecting at right angles from its working face.

734,135. Stanton Ironworks, Company, Limited, Stanton, near Nottingham.

Apparatus for the manufacture of shell moulds and cores for hollow metal castings. The apparatus consists of a dish and separate former clamped together—the distance between them being the wall thickness of the mould or core. The former carries a mechanism for laterally displacing two charging hoppers either into or out of register with the edges of the space between it and the dish.

734,347. J. B. Brennan, 13018 Lake Shore Boulevard, Cleveland, 8, Ohio, USA.

A method of casting. Complementary die-sections are moved into mating engagement to form a die cavity open at opposite ends. The die sections are moved longitudinally whilst in engagement. Molten material is supplied at one end of the die cavity so that it moves with the die sections. The material is inductively heated whilst being fed into the die; is cooled whilst in the die cavity. The die sections at the other end of the cavity are moved out of mating engagement and away from the longitudinally moving casting.



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Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House, 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Tuesday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

FOUNDRY EXECUTIVE, 27; Public School and Engineering College education; conscientious and energetic with good foundry and general engineering experience, seeks a position of responsibility on either the sales or executive staff of a progressive company, who can offer sound future prospects. FE434, FOUNDRY TRADE JOURNAL.

FOUNDRY METALLURGIST (27) requires progressive post as metallurgist or assistant foundry manager in U.K. or overseas. Wide experience in production grey, high duty, and S.G. irons from cupolas, rotary and crucible furnaces. Sand control, non-ferrous melting, general foundry practice, and management. Labour control in mechanised, light and heavy jobbing sections of the industry. Box FM427, FOUNDRY TRADE JOURNAL.

NON-FERROUS Foreman. Experienced in all classes of foundry practice. Training of unskilled labour, loose patterns, odd side work and machine moulding, 10 years' supervision. Box NF428, FOUNDRY TRADE JOURNAL.

FOUNDRY technician (27) A.M.I.B.F. Experience on lost wax and shell casting, seeks post as Representative or similar progressive position, with company manufacturing these castings, or with company supplying materials/equipment for these processes.
Midlands Area Preferred. Box FT429, FOUNDRY TRADE JOURNAL.

WORKS ENGINEER seeks new top level appointment U.K. or overseas (age 35). Comprehensive experience modern maintenance/development/mechanised foundries, associated plant, machine shops. Good background and qualifications.—Box WE394, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

METALLURGICAL CHEMIST, aged under 30 years, required to take charge of laboratory and technical control in foundry producing 30 tons of white heart malleable and grey iron per week. This post offers excellent opportunities to a young man who wishes to acquire further training and experience.
Applications stating age, experience, and salary required to: BAGSHAWE & Co. LTD., Dunstable, Beds.

SITUATIONS VACANT—*contd.*

THE MOND NICKEL CO., LTD., requires a FOUNDRY METALLURGIST, with practical experience of iron or steel founding, for development work on alloy and S.G. irons.—Write, giving full particulars of qualifications, experience, age, salary required, etc., to the MANAGER, Development and Research Dept., The Mond Nickel Co., Ltd., Thames House, Millbank, London, S.W.1. Mark envelope "Confidential Dev. 27."

BRASS Gravity Die Casting TECHNICIAN required for a growing Foundry specialising in the production of Plumbers' Brass-ware. Applicant must have a complete knowledge of this branch of the foundry trade and be capable of organising and maintaining a high rate of production. This is a position for a very energetic and determined personality. Age not exceeding 40. Salary in accordance with experience. Contributory pension scheme. Southern area.—Box BG326, FOUNDRY TRADE JOURNAL.

EXPERT DESIGNER accustomed to Machinery automation work, who can take complete control of department, and possessing progressive ideas, needed for company in South Midlands. Good salary and excellent prospects for right man. Apply stating age and experience to Box ED424, FOUNDRY TRADE JOURNAL.

TECHNICAL REPRESENTATIVE required by Ironfoundry in West Riding of Yorkshire. Ironfoundry experience and engineering background desirable. Applicant would be expected to introduce new business in addition to maintaining existing contacts. Car provided. Applicants should give full details of past experience, age and salary required. Box TR425, FOUNDRY TRADE JOURNAL.

ASSISTANT FOUNDRY MANAGER required by mechanised light grey repetition ironfounders in the Midlands. Knowledge of cupola control and general practical experience are essential. Previous experience of BMM and BICC moulding machines together with knowledge of the manufacture of light castings for the automobile industry would be considered as additional qualifications. This is a job with good prospects in the future for the right man. Write, giving references, age, full details of previous experience and salary required to Box AF426, FOUNDRY TRADE JOURNAL.

FOUNDRY Producing 50 tons per week Ferrous Castings requires FOUNDRY MANAGER who is capable of taking complete control of works side of business. Applicant must have had previous experience in producing Repetition Castings suitable for the Motor Industry. Salary commensurate with past experience and ability. Only first-class man capable of working on own initiative need apply. Box FP431, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

EXECUTIVES wanted. Dohm Group of 14 factories welcome applications from forceful personalities who create activity. Pulverising, surface treatment, ceramic and refractory raw materials including vermiculite, graphite, zircon, silica. Large exporters of metals, plastic pipes, recoverers of plastic waste. Makers of "Dohmfrac" the most economical plastic used for shell moulding. Write to me personally, S. A. DOHM, 167, Victoria Street, London, S.W.1.

SENIOR METALLURGIST required to be responsible under Chief Metallurgist for Iron and Brass Foundry technical control in a large Engineering Works in South Lancs. Either a graduate with a few years practical foundry control experience or a man who has worked in a foundry laboratory and studied metallurgy at night school would be considered. Good salary, pension scheme rights, excellent sports facilities. Give full details of qualifications, experience and salary expected to Box SM430, FOUNDRY TRADE JOURNAL.

FOREMAN DRESSER required for a Steel Foundry in South Wales. Reply giving particulars of experience, age and remuneration required, to BROWN, LENOX & Co. LTD., Pontypridd, Glam.; reference A.G.G.

STEEL FOUNDRY SALES REPRESENTATIVE required by small steel foundry in Sheffield, capable of estimating weights from drawings, pricing the castings and subsequently visiting customers. The position would be partly inside and partly outside work, with a view to ultimately taking full responsibility as Sales Manager. Previous steel foundry experience is essential and applicants should be preferably between the age of 30 and 35 years. Replies giving details of experience, salary expected, etc., will be treated in the strictest confidence, to Box SF433, FOUNDRY TRADE JOURNAL.

FOREMAN required for Iron Foundry in Midlands Area, producing heating appliance and general engineering castings by partly mechanised and floor moulding methods. Interesting position for capable and energetic man with sound knowledge of foundry practice and ability to supervise labour. Flat available as accommodation. Write giving full particulars of age and experience to JONES & ATTWOOD LIMITED, Stourbridge.

METALLURGIST required to control the heat treatment department of a large engineering company situated in the London Area. Applicants should be 28 to 30 years of age and possess a degree or equivalent. Good salary to selected candidate. Please reply, giving details of qualifications and experience to Box MR441, FOUNDRY TRADE JOURNAL.

ADVERTISER L.E.400 thanks all applicants for the post of working foreman in non-ferrous Department and advises them that the position has now been filled.